The American

GAS LIGHT JOURNAL.

(ILLUSTRATED.)

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DEVOTED TO THE INTERESTS OF

ILLUMINATION, HEATING, MECHANICAL, CHEMICAL

AND

GENERAL SCIENCE.

VOLUME XCIII.

(FIFTY-SECOND YEAR.)

FROM JULY 1 TO DECEMBER 31, 1910.

A. M. CALLENDER & CO., Publishers.

OFFICE OF PUBLICATION, NO 42 PINE STREET, NEW YORK CITY.

THE AMERICAN GAS LIGHT JOURNAL

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME XCIII.. No. 1. Whole No. 1,830. | NEW YORK, MONDAY, JULY 4, 1910. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. H. WADELTON, Manager. THOMAS J. CUNNINGHAM and ELBERT P. CALLENDER, Editors.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

OFFICIAL NOTICE—

Experience Section, Pacific Coast Gas Association..... 1

EDITORIALS—

Briefly Told..... 1

The Next Meeting of the Michigan Gas Association—Current Mention.

Review of the Twenty-Fifth Annual Report, Massachusetts Board of Gas and Electric Light Commissioners—No. II..... 2

Proceedings, Third Annual Convention, Canadian Gas Association—Concluded from Vol. XCII., page 1232..... 3

First Day, Morning Session—New Business Methods, by Mr B. G. McNabb—Discussion—Report of Nominating Committee—Election of Officers Morning Session, Second Day—A Speech by Mr. Harris—Gas Engine Development. Construction and Application, by Mr. B. A. Fraser—Discussion—Lecture by Mr. Norman Macbeth—Morning Session, June 11th—Report of Committee on Candle Power and Calorific Value—Discussion—Some Recent Installations of Arc Lamps in Hamilton, by Mr. Howe—Discussion—Some Fraternal Acts—Adjourned.

*The Boiler and the Boiler Washer in and of the Gas Works..... 13

Percentages of Increase, Central Electric Light and Power Stations. 14

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 15

Mr. S. Pemberton Hutchinson Succeeds Mr. McCullough—Extending the Gas Service, Ocean County, N. J.—Personal—"W. B." on Mr. Austin Burt—New Office Home, Atlantic City (N. J.) Company—Other Changes in New Jersey Gas Supply—Annual Meeting, Peoria, Ills.—Changes in Personnel, C. W. Hunt Company—Something from Rockville, Conn.—Third Annual Banquet (Denver) Colorado Traffic Club—The Odell Syndicate on Long Island—Personal—The Aylesby Company Acquires Other Properties—Messrs. R. D. Wood & Co. to Build a 5 Million Holder on the Coast—What the Gas Man Did!—Personal—And Other Items.

The Market for Gas Securities..... 17

Meeting Times of the Various Gas Associations..... 21

Public Lighting Tables for June, 1910..... 30

[OFFICIAL NOTICE.]

Experience Section, Pacific Coast Gas Association.

OFFICE OF THE EXPERIENCE EDITOR,
ROOM 610, 445 SUTTER STREET,
SAN FRANCISCO, CAL., June 26, 1910.

To the Members of the Pacific Coast Gas Association: Someone has said that "Education is not the result of a course of study; it is the result of a course of experience." And the Editor of your Experience Department, whom you honored by that appointment at the last meeting, would like to have you share with him a bit of experience that has helped to make you successful, so that he can tell it to the Association at the Los Angeles meeting, which is so near at hand—September 20, 21 and 22. The name of the sender will be treated confidentially, if so desired.

Faithfully yours,
LEON B. JONES, Editor.

BRIEFLY TOLD.

THE NEXT MEETING OF THE MICHIGAN GAS ASSOCIATION.—The method and manner of carrying on the meeting last year of the Michigan Gas Association, and that occasion has been referred to many times since by (and always with pleasure) those who shared in it, are ready for duplication this year. In fact, the following official circular from the Association Secretary—the "only" Glenn R. Chamberlain, who never does things by halves, and who never puts off until to-morrow that which he should have done to-day—which should be read carefully by those affiliated with every other Gas Association, since all such are heartily invited to assist in the trip. The circular is:

MICHIGAN GAS ASSOCIATION,
OFFICE OF THE SECRETARY,
GRAND RAPIDS, MICH., June 14, 1910.

Dear Fellow Members: We are to have another boat trip this year. The Association meeting will be held on board the boat we had last year—"The City of St. Ignace." It will be a 3½ day trip (one being Sunday) into the Georgian Bay, starting from Detroit at 9:30 A.M., Friday, September 9th, returning to Detroit Monday evening, September 12th. This is the most picturesque and interesting water trip in the world. We will have a-half day's side trip through the Thirty Thousand Islands, and a chance to do a day's fishing in this greatest of fresh water fishing districts. We haven't the room here to go into the 101 interesting, recreative features of this trip, but those who went last year appreciate what this one will be. It will be a stag affair ($30 per person, two persons in each stateroom) and the price includes meals, berth, side-trip through the Thirty Thousand Islands, in fact all entertainment and an absolute guarantee that you will have the best time you ever had in your life. We are to have a remarkably fine collection of papers, a majority of which are of particular interest to the smaller properties. We are going to find it difficult to accommodate all who want to go, for last year's trip has been the talk of the country, and from everywhere have come requests for reservations should we have another boat trip this year. We want, however, to give our members and their associates and friends the first opportunity to reserve the number of tickets they may want, and we trust you will, therefore, promptly use the inclosed postal card that we may know your wishes. The matter of deposit on the reservation will be taken up with you later. But the main thing to know now is, "How many and who to provide for."

Yours very truly, GLENN R. CHAMBERLAIN, Sec'y-Treas.

CURRENT MENTION.—

WE are indebted to Mr. J. D. Shattuck, General Manager of the Philadelphia and Suburban Gas and Electric Company, Chester Division, who informs us that we are in error respecting the Class Year of Yale, which marked the graduation of the late Mr. Thomas O. Horton. Mr. Horton graduated in the Class of 1891, instead of 1895, as we had it. It is worthy of note in this connection that other members of that Class were: A. C. Pease (deceased), who, at the time of his decease, was Superintendent of the Lowell (Mass.) Gas Light Company; Mr. R. K. Wehner, of the Isbell-Porter Company, Newark, N. J.; Mr. H. A. Carpenter, President of the Riter-Conley Company, of Pittsburgh, Pa.; Mr. J. D. Shattuck, General Manager of the Philadelphia Suburban Gas and Electric Company; and Mr. S. H. Bunnell, of the Griscom-Spencer Company. These five gentlemen, by-the-way, can be plainly seen standing beside each other in the group photograph, American Gas Institute meeting, Detroit.

LIBRARY OF CONGRESS, JUL 5 1910, SMITHSONIAN DEPOSIT.

IT is not possible to keep permanently down a good man, and the latest illustration we have of this truism is in the case of Mr. Frank K. Wells, whose determination to engage in business on his own

account was unfortunately made just prior to the mysterious panic of 1907. Mr. Wells, having retired from the business field on strictly personal account, has accepted the management of the New England agency of the Pittsburgh Water Heater Company, with headquarters at 56 Broad street, Boston. All who know this capable salesman and sterling gentleman will join with us in wishing him every possible success on the greatest possible scale.

WITH exceeding satisfaction we note the reappointment, by Governor Draper, of Mr. Forrest E. Barker, to the Chairmanship of the Massachusetts Board of Gas and Electric Light Commissioners.

THE South Shore Gas and Electric Company, Babylon, Long Island, the plant of which is to be located at West Babylon, has awarded a contract for the entire new gas works to the Gas Machinery Company, of Cleveland, O. The contract includes a water gas set, purifiers, meter, boilers, oil storage tank, connections and miscellaneous machinery.

MR. J. A. MAYERS informs us that the Cruse-Kemper Company has been awarded the contract for the construction of a storage holder up to retaining 200,000 cubic feet on the works of the Shamokin (Pa.) Company. This is the 12th contract the Cruse-Kemper folks have entered into since March 1st.

MUCH ado was made last week in the Philadelphia newspapers respecting a fire that occurred in a drip-pump apparatus in the U. G. I. Company's 25th Ward Station, Richmond and Tioga streets, in the named city. Judging from the tales told to their readers by the press, a catastrophe was imminent, in that the holders, "towering skyward," were close to the blaze. All of which is true, but the blaze was just sufficient to prove how well drilled the U. G. I. Company's fire force is to act in such an emergency. The loss was really a trifling one.

THE New Britain (Conn.) Gas Light Company is building an ammonia saving set. The B. H. Hibberd Company has the contract for the construction.

THE Waynesboro (Pa.) Gas Company's new plant was satisfactorily started up the 23d ult. The generating capacity is rated at 250,000 cubic feet per 24 hours.

MISS SARAH ELIZABETH CRAIG informs us, under date of the 28th ult., that she has just completed a two weeks' engagement at Pittsburgh, Pa., on gas cooking demonstrations, and is now giving a four weeks course for the Clinton (Ills.) Gas and Electric Light Company. From thence this busy lady will journey to Columbus, Ga., where she will lecture on a like theme for the local Gas Company.

AT the regular Council meeting last month of the Illuminating Engineering Society important action was taken respecting the use hereafter by the Society of the metric system. After a lengthy discussion it was resolved that, wherever practicable, metric equivalents should be placed in parentheses after notations of English measures in matter presented to or read before the Society. Of course, this action is taken in the thought that the practice will familiarize the general readers of the Society's "Proceedings" with the metric system, thus facilitating the adoption of that system.

THE proprietors of the Illinois Valley Gas and Electric Company, under the new franchise granted for the operation of the plant at Ottawa, Ills., have authorized the following rate schedule, to become effective the 1st of September: From Sept. 1, 1910, to Sept. 1, 1912, $1 per 1,000. It is agreed on that the price shall be readjusted every 10 years, from 1915, with the understanding that at no time, after 1912, shall the price exceed $1. To furnish free gas to all the public buildings—these to include city hall, fire and police houses, libraries and water works station. To extend its mains and give service where such may be petitioned for by two patrons on any one block. To pay the city $100 per year for the privilege of crossing the Illinois river with its pipes. All of which looks not quite enough. The payments on returns are incomplete, in that the Company failed to stipulate its willingness to have the lunches of the officials cooked by gas every day in the week save Sunday; said lunch to be served free to the "Fathers."

WE hope that due and producing heed will be given to the Postal Card appeal, recently made to the fraternity by Mr. William Schade, Wrinkle Editor of the Pacific Coast Gas Association. It will likely be remembered that Mr. J. M. Berkley, who was elected to fill this prominent position last year, was obliged later on to resign, whereupon President Cline named Mr. Schade to the office. This in a manner handicapped Mr. Schade, for it takes quite a bit of time to break one's self into the duties of the place. So we ask that his appeal to the country at large for wrinkles be duly heeded. As he writes respecting this, "Do not wait until the last minute; but do it now. * * * Do not think what you have is of no importance; it may look that way to you, but let somebody else be the judge." His address is 616 West 9th street, Los Angeles, Cal.

"IT is gratifying to note that recent reports of the operation of the vertical benches built by the Gas Bench Construction Company, of St. Louis, and in operation at the plant of the Columbia (Mo.) Gas Company, are to the effect that the same are operating to the entire satisfaction of the owners. All the gas in the named place is now being made in the verticals, and has been for several months, the horizontals having been shut down. These benches have been in continuous operation for over a year, and the operation in that time demonstrates conclusively that everything claimed by their advocates has proven true. As an illustration of this, the increased yield of the verticals over the horizontals averages 16 per cent., and also demonstrates freedom from naphthaline troubles; and stopped standpipes are things of the past. Heavy tar in the hydraulic main is also unknown. The coke is of fine quality, and drops from the retort instantaneously. It is further demonstrated that vertical benches solve the labor problem in coal gas making, as the work is not only less arduous on the operators, but no skilled labor is required. Wherefore, the labor cost per 1,000 cubic feet of gas made is gratifyingly less, even to that necessary in the manufacture of water gas.—C."

[No. II.]

Review of the Twenty-fifth Annual Report, Massachusetts Board of Gas and Electric Light Commissioners.[1]

[Prepared for the JOURNAL, by MR. H. THURSTON OWENS.]

Profits.—The total profits of both gas and electric companies for the past 3 years are given as follows:

	1907.	1908.	1909.
Gas Companies	$3,737,146.70	$4,456,892.67	$4,601,485.38
Electric Companies	3,466,842.70	3,694,234.68	3,641,143.83

From this it will be seen that, during the past year, the gas companies showed a gain of $150,000 against a loss for electric companies of $50,000.

Dividends.—Corresponding figures for dividends are as follows:

	1907.	1908.	1909.
Gas companies	$2,314,661.44	$2,826,039.24	$3,214,252.78
Electric companies	1,826,802.00	2,019,933.50	2,144,202.34

The increase in dividends for gas companies nearly reached $400,000, as against $125,000 for electric companies. The returns in percentage on capital stock of companies paying dividends are as follows:

	No. Companies		Percentage	
	1908.	1909.	1908.	1909.
Gas Companies	53	52	9.1	10.2
Electric Companies	32	40	9.65	9.39

Companies which appear not to have earned expenses numbered as follows:

	1907.	1908.	1909.
Gas Companies	4	6	5
Electric Companies	1	5	2

Companies which have not earned enough to declare dividends are thus returned:

	1907.	1908.	1909.
Gas	21	23	21
Electric	27	26	18

Surplus.—From the balance sheets submitted the Board has deduced the following surplus in cash:

	1907.	1908.	1909.
Gas Companies	$6,661,664.32	$7,489,496.52	$8,067,915.91
Electric Companies	2,490,760.96	2,828,516.80	2,867,440.42

	Surplus: Percentage on Capital.		
	1907.	1908.	1909.
Gas Companies	22	24	25
Electric Companies	12.14	13.78	17.67

Taxes.—The amount paid by gas companies for taxes increased in over $50,000 or from 6.4 to 6.6 cents per 1,000 sold.

Reductions in Price.—In 20 coal gas, 1 acetylene gas and 18 electric plants, the maximum net price was reduced, so that the sixteenth reason for the high cost of living, which Senator Lodge did not divulge, can hardly be attributed to these commodities.

Average Price of Gas.—Several methods of averaging are used to determine the average price of gas and the results for the past 3 years are given as follows:

Average price paid by consumers for coal gas to companies selling more than 30 million cubic feet annually.

1907.	1908.	1909.
$0.923	$0.897	$0.893

Excepting the Boston Company:

1907.	1908.	1909.
$0.98	$0.96	$0.955

The remainder of the coal gas companies shows:

1907.	1908.	1909.
$1.58	$1.56	$1.58

Average Price Received by All.

1907.	1908.	1909.
$0.948	$0.921	$0.914

In the year 1886 the last named average was $1.72.

1. No. 1. See JOURNAL, *ante*, Page 1226.

[OFFICIAL NOTICE.—CONTINUED FROM VOL. XCII., PAGE 1232.]

THIRD ANNUAL CONVENTION, CANADIAN GAS ASSOCIATION.

HELD IN ALEXANDRA RINK, HAMILTON, ONTARIO.

FIRST DAY.—MORNING SESSION.

The President introduced Mr. B. G. McNabb, who read the following paper on

NEW BUSINESS METHODS.

The first, and most important, part when about to establish a new business department is to secure the services of a good new business manager. This is easier said than done, as all salesmen will not make successful new business managers, even though they may have the best of sales records. The successful new business manager must be able to teach others how to sell his company's products at a profit. He must be tactful and enthusiastic, and endeavor at all times to obtain the goodwill of the public. He should have the hearty co-operation of all officials of the company, without which he cannot obtain the best results.

The size of the department should depend entirely upon how fast you wish to develop the business, the size of the city, the number of miles of mains, compactness of the city, whether straight gas or combination gas and electric company. The former statement may appear a little peculiar to a great many of you, gentlemen, but I have found that, by cutting down and putting men in a territory previously considered only large enough for one, we were able to secure just double the business. To do this successfully requires salesmen, not order takers. Some companies use only one representative to about 30,000 population, while others have as many as one for each 7,000, and in all cases where the latter condition exists the best results are obtained. If a representative's territory is too large, he cannot cover the ground thoroughly and obtain the business that is in it.

Too much care cannot be taken in selecting representatives. We call our salesmen "representatives," because each man represents the company in his respective territory. In the eyes of the public, he is the company, and, very often, is the only one with whom they ever do business. The goodwill of the consumers in his territory depends to a large extent upon the representative himself.

A successful representative should be a good salesman, have a fair education, be neat in appearance, courteous and possess considerable tact. I have found that the most successful representatives are obtained by employing salesmen who have been successful in other lines of business. We always start them out with one of our best representatives for a week or so, or until such time as they can talk to the consumer intelligently about what they have to sell. We find it extremely difficult to obtain first-class salesmen owing to the absolute necessity of our men having to be able to speak both French and English.

The method of paying representatives is a question that has often been discussed, and I believe each method has its good points as well as its disadvantages. I should like very much to hear this subject discussed at this meeting, with a view of bringing out the different methods, so that each manager will then be able to adopt such a plan, or parts of different plans, as best suits his conditions. The method that we follow, and with good results, is to pay a good liberal salary, in addition to which we offer a considerable sum of money each month to be divided into several prizes.

I do not believe in the orders taken. My experience teaches me that it pays to get a good salesman and pay him a salesman's salary. The wrong kind of a salesman can do more harm in a week than a good man can overcome in a month, and I think experience has taught us all that a cheap article is dear at any price. To obtain the best results the city should be divided into territories of from 10,000 to 15,000 population, and each territory should be so divided that all will have about a like number of residential and business districts. Care should be taken to see that they are as compact as possible, thereby saving considerable time and expense, and also assisting the representative greatly in keeping in close touch with his territory. Each representative should be given credit for all business obtained in his territory. This does away with the representatives taking business in one another's territory when they should be working their own.

All applications, contracts and records should be thoroughly explained to the representatives before they start on their territory, as well as to furnish them with cuts and full description of all appliances. The representative should be started first on a house-to-house canvass to obtain a record of what the household is using, if you have not already such a record.

We use a 4 by 6 filling card, which gives a complete record of what is used on the property, as well as the tenant's name, the owner's name and address, what they are "prospects" for, and when to call again. From these cards the "Follow-up" cards are made up, which show the streets, resident's name, what day to call, and what he is a "prospect" for. The record card is then filed away, according to street and number, while the "Follow-up" card is filed according to the date the representative is to call.

Every morning the cards for that day are taken out and given to the representatives, who make the calls, reporting on the back of the card the results of their calls. If they are to call again, the card is turned in and placed with other calls for that day. The card system answers two purposes. They give us a complete record and also afford the new business manager an opportunity to check up a representative's work at any time. We find our follow-up cards invaluable to us whenever a representative leaves our employ or is sick, as we can then turn over his prospects to another man, avoiding the necessity of making a new canvass.

I have with me a number of these cards, as well as samples of the different forms we use in our department, which I shall be pleased to give to anyone upon application.

Every gas company should have a first-class display room where all kinds of appliances can be shown to the public. This not only assists the representative to get the business but creates a good impression on the minds of the public. The display room, which should be in a conspicuous part of the main office, should be well fitted with the proper kind of furniture, easy chairs, etc. A free telephone and a large mirror will attract a great many ladies and also help sell appliances. A display room not properly kept is worse than none at all, and I would like to suggest to you who are contemplating installing a display room that you should make it just as nice and furnish it just as well as you possibly can. You can't make it too attractive, and you will soon get back what you spend on it.

A few years ago a great many companies thought that appliances sold in a display room must be sold at or below cost in a great many cases. Those of you who have given this matter serious consideration, I believe, will agree with me that this day has passed. On February 1, 1910, we raised the price of every appliance which we sell, approximately 30 per cent., and I am happy to say that, instead of our appliance business falling off, we have more than doubled it, and to the gas manager who is having trouble in disposing of his appliances at a profit I would say, get the right kind of salesman in your appliance room and the profit will soon be forthcoming. This year we increased the prices of our gas ranges $3 over the price of last year. Some people said we would never be able to sell them at the increased price, but last month we well exceeded the sales of a year previous, which only goes to show that, with the right kind of selling methods, just as much business can be obtained at a profit as when appliances are sold at cost.

To encourage our representatives to turn in more business and to keep them enthused, we have inaugurated a prize or bonus system. We appropriate $75 every month for this purpose, which is divided into several prizes, ranging from $15 to $5. A prize is offered for the largest number of points in these items: Largest number of gas arcs, of gas ranges, of new consumers, etc. In some cases we have a first, second and third prize on the same thing. Each representative is given a certain number of points for every article he sells. We fix the number of points to be given for each appliance on the first of every month, and change the number of points according to the class of business we wish to push. We have found that this money acts as an incentive for our men to work overtime, and it is amazing how much extra business can be obtained by it. We endeavor to have our representatives specialize on one or two things at a time, such as gas ranges and water heaters, or gas arcs and residence lighting. Of course, judgment must be used in pushing them at the opportune time.

We assist our representatives to get business by keeping up a continual newspaper campaign at all times. In addition to this, we send out circular letters at different intervals to every house in the city, explaining the article which we are trying to sell, and find we get exceptionally good results from this class of advertising. We also use billboard advertising to some extent.

Our Company, like a great many combination gas and electric companies, used to push electricity for lighting in preference to gas,

with the result that we found a great many gasoline plants creeping in and taking some of our most profitable business. We also found a large number of dissatisfied gas consumers who were using cheap and worn out lighting appliances. Early last fall we started an agressive gas arc campaign, and had our representatives confine their efforts entirely to existing gas consumers and merchants using gasoline for lighting. Since starting this campaign, we have installed nearly 2,000 four burner Humphrey arc lamps, displacing 4,100 single burners and over 100 gasoline lighting plants.

The management was somewhat sceptical as to whether or not this campaign would cause our electric consumers to want to change over to gas and thereby reduce our electric revenue. I am glad to say it did not. We kept a very close record of all gas arcs installed for a period of 6 months and found that each arc placed with old consumers showed a net increase of 1,020 cubic feet per lamp per month, over the same period for the previous year, or an increase in yearly consumption of nearly 25 millions cubic feet. A number of arcs were installed in stores where they previously used electricity, in conjunction with a few single burners, and found that, even with this increased consumption of gas lighting, the electric consumption was as high or higher than previously. Instead of our gas arc campaign hurting our electric business we found that our electric revenue increased. This we attribute to our having educated the merchant to use more light.

We also keep two high class industrial specialists who devote their entire time all the year around to this end of the business. This is a business in itself and requires men of exceptional ability and special training. Our selling force consists of 20 representatives and two industrial specialists. Each morning we meet and go over the previous day's work, and we have found that our representatives receive a great deal of benefit from these meetings, especially when one representative is asked to sell the other a given article before all the rest. We found that this method not only brings forth new arguments at every meeting, but gives the representative confidence in himself and makes it almost impossible for him to get rattled. It also gives us an idea of how well he knows his business.

We have instituted a suggestion box, and each man in the department, whenever he has a suggestion to offer, writes it on a piece of paper and drops it in. At the end of every two weeks we hold a meeting, at which time these suggestions are gone over and the merits of each discussed.

On the first of each month we have a banquet, at which time our prizes are awarded. We endeavor to make this more of a social than business function, and find that it brings us all closer together, besides giving an opportunity to talk over our experiences, this causing the representatives to feel that we appreciate the work they have done. I consider the money spent for these banquets is money well invested.

Discussion.

Mr. Hewitt—It appears to me one of the great advantages of the new business department, as followed in Montreal, is that they there push the sale of both gas and electricity. Plenty of food for thought is contained in Mr. McNabb's paper, and one thing certain is that Mr. McNabb knows a good deal more about it now than he did before he came to Toronto. [Laughter.] A year ago last December, when we started to use new business methods, we adopted some, if not all, as we had been operating along somewhat different lines. After adopting the new methods we experienced exactly the same success Mr. McNabb mentions, up to a certain point, only we got fully 50 per cent. from the electric light companies, and are still getting it at that rate—no trouble with gasoline plants in our experience to any great extent, but did [illegible]m electrical opposition—however, as I have said, 50 per cent. of the business transacted by us was electrical. This I consider important, since we were able to hold on to the other part of our business as well. Up to that time we gave service to anybody who wanted it or asked for it, but now we look around a district for new business, trying to sell service, and it has meant an enormous increase in our business. Our increase last year in output was 21 per cent., and I can account for the increase in no other way. Last month we had 5,600 mantles on maintenance alone, all to hand since last December. In addition we have developed a single lighting apparatus, which, too, has been very satisfactory. There is a great deal of food for thought in Mr. McNabb's paper, which has been so well and carefully prepared. I understand, Mr. President, there will be further opportunity for discussing this paper to-morrow, when we are to have a lecture by Mr. Norman Macbeth, of Gloucester, N. J., which will be a development of this same subject. Another remark I would like to make is that in a paper I had the honor to give last year I stated that 25 cents would cover an arc lamp per month and wipe off the cost entirely in the course of three years. I do not wish to withdraw one word of that, for in only one instance has that cost been exceeded, and then but very little. [Applause.]

The President - I think it is quite time that we have to cater to the public, giving them good service, for the day is past when the consumer will come to the company. If the Nominating Committee has completed its labors we will hear the results. I think I see Mr. Philip in the room.

THE REPORT OF THE NOMINATING COMMITTEE

was then read, as follows, by Mr. E. J. Philip:

Mr. President, we had some difficulty in deciding this matter. Mr. W. H. Pearson, Jr., as First Vice-President, naturally should have been chosen President, but as he has severed his connection entirely with the gas manufacturing industry, he suggested that I should be nominated myself, but, under the constitution, I was not legible. It was finally decided to name Mr. Arthur Hewitt, General Manager of the Consumers Gas Company, Toronto, President. We felt as the interests of the Association were at stake on the coal question, we should have a man connected with a large company. The list of office bearers was finally named as follows:

President.—Mr. Arthur Hewitt.
First Vice-President.—Mr. E. J. Philip.
Second Vice-President.—Mr. A. W. Moore.
Secretary-Treasurer.—Mr. J. Keillor.
Executive Committee.—Messrs. J. F. Leishman, J. H. M. Young, R. A. Wallace, Chas. Forbes, P. S. Coate.

Mr. Hewitt—I think a person would hardly be human who would not like his services to be appreciated, but I personally do not think the committee acted fairly in this matter. If Mr. Pearson has definitely decided not to accept the presidency, I think Mr. Keillor, of Hamilton, should have been given the position. I don't know anyone who has done more or worked harder for the Association than he has; and I would like to suggest that the Committee reconsiders this matter.

Mr. Philip—The experience I have had has shown me that, after all, the work of the Association falls largely upon the Secretary, even more than the President, and as Mr. Keillor has been appointed to that position I think the Committee made no mistake, for he was put where he can be of most service.

The President—I am sure we all regret the retirement of Mr. Moore, our Secretary-Treasurer, who insisted upon being relieved. It is, as Mr. Philip pointed out, the work of the Association falls upon the Secretary. He is called upon on many occasions and has to use his discretion in the interests of the Association, and certainly Mr. Moore is entitled to great commendation. We are very sorry he is retiring, but think we have a good substitute in Mr. Keillor, who has taken a most active interest in all executive matters and has the interests of the Association at heart.

A vote of thanks was moved by Mr. W. H. Pearson, Jr., to Mr. Moore. [Seconded by Mr. Hewitt, and carried unanimously.]

Mr. Moore—I am sorry in a way to give up the office, but as I feel that I have done my share, I am quite willing to help the Association in any way I can. The first year the Association was formed I took the office temporarily until things got under way, as it were. The last 2 years two or three things were in abeyance that I have been perhaps more closely in touch with than any of the others, so I just hung on until the details were worked out. Now that these are out of the way, I feel you have chosen a good man for the position. Gentlemen, I wish to express my appreciation to you for the vote of thanks tendered me. [Applause.]

The President—While we are losing Mr. Moore as Secretary, he is still on the Executive, so we will yet have the benefit of his advice.

ELECTION OF OFFICERS.

On motion the report of the Nomination Committee was accepted and adopted.

Mr. Powell—Has the committee considered the question of place for our next convention? If so, what places have been mentioned?

Mr. Philip—Windsor, Ottawa, Quebec and Toronto were mentioned. We should have a place with good hotel accommodation, and also some means of entertainment, both of which the named places could give. We thought the first would be suitable enough, even though our hotel accommodation would have to be Detroit, but there would be plenty of river entertainment. It should be a good place for the gas

appliance end of it, being so close to the American line; but we further thought in that event we should communicate with the Manager of the Windsor Gas Company; it would be hardly fair to do otherwise. However, the matter was left in the hands of the Executive.

Mr. Powell I do not agree in this. I think we should go to where we can get the largest exhibit, places like Toronto, Ottawa or Montreal. We would have a larger attendance in such places—that's what we want. I went around our town yesterday among the plumbers, and they nearly all promised to come to see this exhibition.

Mr. Coate - I believe in a place like Winnipeg or some other center where they need assistance. Toronto, Montreal and Ottawa being large, prosperous cities, do not need that. Of course, it is very much nicer to go to large towns, but there are towns of say from 20,000 to 40,000 that could accommodate this Association.

Mr. Dunderdale—I hope you don't class Winnipeg with these towns. [Laughter.]

The President—Of course, this question has its "pros." and "cons.," which the committee will consider fully, and I think we can afford to leave it with them. I will now ask Mr. Keillor to tell what the Entertainment Committee has laid out for us to-day.

Mr. Keillor—Mr. President and Gentlemen: Only one other entertainment is slated for to-day, and that is the luncheon to be given by the Hamilton Gas Light Company at the Hamilton Yacht Club House at the Beach. We are to be photographed in front of the rink at 4 P.M. Special cars are provided to take the party to the Beach.

MORNING SESSION, JUNE 10.

President Norris called the meeting to order at 10:30.

The Secretary read a communication from the Manufacturers' Natural Gas Company, also one from the Canadian Meter Company, inviting the members of the Association to visit their plants.

A SPEECH BY MR. HARRIS.

Mr. Coate—I see we have with us to day Mr. George Harris, now of Boston, but once a good Canadian citizen. I should, and I know the other members will like to have a word from him.

The President—We are very pleased indeed to welcome Mr. Harris to-day, and hope he may have something to say to us.

Mr. Harris—The pleasure is all mine to be able to be with you at this convention. As Mr. Coate said, I was a Canadian citizen, of which fact I am not in the least ashamed; but on the contrary, am proud of it, just as the United States may well be proud of her connection with Great Britain, who gave her her first President, George Washington, who came of a good old Leicestershire family. She might also be proud of her British connection, for to her she owes the credit for those seats of learning that are known the world over—I refer to Harvard and Yale Colleges. Being called on to speak as I have been to-day brings to mind a little story told of two Scotch ministers, one of whom always preached from notes, while the other twitted him about it, telling him that while he was writing his notes an imp was leaning over his shoulder who, seeing what was being written, whispered something into the ear of his elders and spoiled the effect of his sermon. On the contrary, he said, I always preach extemporaneously, so that the devil himself cannot tell what I am going to say. [Loud laughter.] I am very glad to be here to see the faces of old friends and renew old acquaintances and making new ones. And, as one of the original 18 members who formed the National Commercial Gas Association in Boston, I wish to extend, on behalf of that organization, a hearty invitation to our next annual meeting and convention exhibition, to be held in Boston, December next. You will remember once there was a famous "tea party" in Boston, but when you meet with us in that city in December there will be a "Loving Cup." [Loud applause.]

The President—I am sure we are all delighted to have Mr. Harris back with us to-day, and appreciate very much the kind invitation of the National Commercial Gas Association extended through him, and trust some of us may find it possible to take a run over to Boston. The next order of business will be a paper, by Mr. R. A. Fraser, on

GAS ENGINE DEVELOPMENT, CONSTRUCTION AND APPLICATION.

The prevailing impression in the minds of the majority of people is that the gas engine, or as it should be more correctly termed, the internal combustion engine, is a development of modern times. Such is not by any means the case, as very early in the history of mankind it was understood that heat had the effect of producing work by the expansion which it caused in the substances upon which it acted.

Probably the earliest records which we have of such action appear in the records of Hero of Alexandria, in which we find a description of the action of heat and water, and the manner in which this was applied by the priests of the time, about 130 B. C., in the production of phenomena which appeared to the common multitude to partake of supernatural power.

It is altogether probable that the ancients possessed a greater knowledge of the effects of heat than has reached us in any permanent records, and as such knowledge was practically lost sight of during the ages of darkness which followed the downfall of the Roman Empire, it is possible to trace the history of modern prime movers only to a period at which the light of modern thought began to illuminate the doings of mankind. It is probable that one of the earliest machines in which the action of heat was converted directly into motive power was not only a gas engine but a gas turbine.

The so-called "smoke-jack" used in mediaeval times to operate the turnspit before the fire consisted of a sort of screw propeller wheel, placed in the chimney and caused to revolve by the action of ascending gases, the motion being transmitted by means of gearing and belts to the spit which carried the roast before the fire.

There are numerous instances of such devices, illustrations appearing in the sketch book of the great artist engineer, Leonardo da Vinci, as well as in other works of the time, and the "smoke-jack" may be considered as much a prototype of the gas turbine as the machines of Hero and of Franco have to be considered predecessors of the steam turbine.

About the first record of any patent covering gas engines was a British patent, taken out in the year 1791, by John Barber, for a motor which seems like an anticipation of present-day attempts to produce a gas turbine. Strange to say Barber used gas, produced by distilling wood, coal, oil, or other hydrocarbons in a retort, the coal gas being delivered with the proper amount of air into an explosion or combustion chamber, where ignition took place and the products of combustion were discharged against the buckets of the turbine wheel. Barber went so far as to anticipate a modern device, used on gas engines of large power in injecting water into the combustion chamber to reduce the temperature of the mixed steam and gases acting on the wheel.

There appears therein to have been an anticipation of most of the elements of the gas turbine, but as the principles of turbine construction were not clearly known at the time, the machine was doubtless of very low efficiency. This, however, seems to have been the first real effort to develop a machine utilizing combustion at constant pressure.

Leaving these early engines as more or less impracticable, the first real combustion motor, in the modern sense of the term, seems to have been that of Robert Street, who, in 1794, took out a British patent for an engine in which the piston was moved in a cylinder by the pressure of gases generated by the combustion of spirits of turpentine. In Street's engine the bottom of the cylinder was heated by a fire underneath and, with the piston at the lowest part of the stroke, a few drops of turpentine were injected and vaporized. The upward movement of the piston drew in some air and also sucked in a flame which ignited the inflammable mixture and the explosion drove the piston to the top of the stroke.

Here we find the use of the suction of the piston to draw in the charge and the use of the external flame for ignition, together with other details embodied in more recent machines. Unfortunately the constructive methods available at the time were inadequate, and prevented the development of the ideas of this clever inventor.

The next development of the internal combustion engine is found in a patent, taken out in 1801, for the utilization of illuminating gas. at that time illuminating gas had been but very recently introduced, and this is probably the first record of the use of illuminating gas for the production of power.

This remarkable man seems to have anticipated nearly all the elements which go to make up the modern gas engine. He admitted the gas and just sufficient air to make it ignite into the cylinder, the gas and air being compressed separately in two pumps before entering the engine cylinder, and ignition was effected by the electric spark. You will note that development towards the modern gas engine was proceeding along logical lines and in a definite manner. Street, as we saw, used the suction of the piston to draw in the charge, Lebon appreciated the necessity of compression, and utilized this feature as well as electric ignition, and it is probable that his early death alone prevented the development of the internal combustion engine much earlier than actually was the case.

It is true that the manufacture of illuminating gas was then in its infancy, and that the production of the electric spark was also possible only in a very primitive manner, but the principles of the most modern types of gas engines were included in the plans of Lebon, who must be considered as an important pioneer very early in the field.

That the correct principles upon which an internal combustion motor should be built, were beginning to be understood at the commencement of the nineteenth century, was evident. Cheverton, who experimented in 1826 with the problem, stated the case very clearly, and the situation could hardly be expressed more definitely to-day than in his words: "It has long been a desideratum in practical mechanics to possess a power engine, which shall be ready at any time, capable of being put in motion without any extra consumption of means, and without loss of time in its preparation. These qualities would make it applicable in cases where but a small power is wanted and only occasionally required. They are so numerous, and the consequent saving of human strength would be so great, that the advantages accruing to society would be immense, if even the current expense were much greater than steam power."

The American patent of Drake is of interest, because it contains mention of the incandescent tube for the purpose of igniting the charge, a plan also suggested by Siemens, and practically applied later by Daimler. It is also of interest to note that both Drake and another inventor, Varnett, stated that their engine could be operated with the vapor of hydrocarbon liquids, which was evidence that the field of the internal combustion engine was being extended beyond the limitations of gaseous fuel.

It is, however, a somewhat sad commentary which the Association would do well to consider, in so far that, while the earlier experiments and engines were all built to use illuminating gas, the most remarkable developments have followed the application of engines using hydrocarbon liquids as fuel, whereas little or nothing is being done to extend the use of engines using gas as fuel.

While numerous patents were taken out from time to time, it was not until the year 1866 that any important developments took place, when Dr. Otto, the German inventor, brought out his patent, and to him is undoubtedly due the credit for developing the internal combustion engine as a commercial possibility, and in spite of the great advance made in the design and construction of gas engines since that time, as in the case of the steam engine, which to-day practically retains all the principle characteristics originally designed by Watt, so in the case of the gas engine, what is still known as the Otto cycle of operation as first developed by Dr. Otto, still stands. The operative cycle as defined by Dr. Otto, is:

1. Drawing in the charge of gas and air.
2. Compression of gas and air.
3. Ignition at dead point with subsequent explosion and expansion.
4. Discharge of the products of combustion from the cylinder.

It is a striking tribute to the wonderful efficiency and economy of the gas engine that, while only 1 stroke out of 4 is the working stroke, or expressing the same idea in another manner, 3 parts of the engine's time is wasted, yet in face of this severe handicap the internal combustion engine to-day bids fair to eventually beat all rivals in the economical generation of power. We have just seen that 4 operations are needed to make up the cycle, namely, suction, compression, ignition and exhaust, from which the title 4-cycle is taken, this being the type in most general use to-day, particularly for industrial service.

The modern 4-cycle engine takes 4 strokes of the piston, or 2 revolutions of the crankshaft, to complete the cycle, only 1 stroke being the working stroke, the remaining 3 being taken care of by the momentum of the flywheel.

Right at this point is where some confusion frequently arises in the minds of those not familiar with the operation of the gas engine, and it is made to suffer in comparison with one of its competitors, steam engines, since in the case of the steam engine only two functions are carried out in the steam cylinder; that is, ignition and exhaust of the steam, the preparation of the fuel being provided for apart from the engine through the agency of the steam boiler, and it is really through the failure to grasp the simplicity of the principle upon which the internal combustion engine operates that we so commonly hear the expression that gas engines are unreliable. As a matter of fact, nothing could be more unreasonable than a statement of this nature, as it is only necessary to recall what constitutes the 4 operations necessary to complete the cycle, and, remembering these, it may be taken for granted that, provided an engine draws in a full and proper charge, provided that charge is properly compressed, fully ignited and freely exhausted, then, no matter how crude the design may be, how indifferent the materials, nor how poor the workmanship, that engine will run, and continue to run, until one of the functions which go to make up the cycle fails.

It is impossible to lay too much stress on this aspect of the matter, as it lies at the root of the subject, and a proper appreciation and understanding of the cycle of operations would often save much mental research and quite often a good deal of hard physical effort extended in a vain effort to start an engine by turning the flywheel, the engine having stopped, apparently for no good reason, but as a matter of fact through the failure of one of the functions which go to make up the cycle of operations.

Dealing with the factors which make up the cycle, and commencing with the piston beginning the suction stroke, a partial vacuum is created, which draws in a mixture of air and gas, the mixture continuing to flow in until the end of the first stroke, when the inlet valve either automatically closes or is mechanically closed. The return stroke of the piston compressing the confined mixture is brought about by the momentum of the flywheel. Compression is absolutely necessary in order to obtain the proper ignition of the charge and get power and economy from the engine. In a very general way and within limits, the higher the compression, the greater the power developed. The amount of compression, however, it is desirable to have is, of course, limited, for if excessively high compression is carried there is a tendency to ignite the mixture prematurely, setting up very severe stresses in the engine. The best accepted practice is to carry a moderate compression of from 50 to 60 pounds per square inch in gasoline, up to as high as 170 pounds per square inch in the case of producer gas.

The third stroke in the cycle is the working stroke obtained from the ignition or explosion of the charge; or, to put it more correctly, due to the rapid expansion of the charge, which corresponds to the expansive effect obtained in the steam cylinder from the steam.

It is important to note that, in order to get the maximum power from a gas engine, ignition should take place when the crankpin is about 15° below or behind the dead center. This practically corresponds to lead in the steam engine which this lead has to be provided for, since there is an interval of time which elapses between the time the electric spark takes place and before the charge is fully ignited, by properly arranging the igniter lead, the greatest force is given to the piston just as it passes over the dead center. I may point out that the internal combustion engine is sometimes referred to as an explosive engine and the ignition of the charge we speak of as an explosion. This, of course, is an erroneous way of expressing the action, as what actually takes place in the cylinder is very rapid ignition and expansion; and the fact that lead has to be given to the ignition to provide for complete ignition and expansion would seem to prove that this contention is correct.

The fourth operation of this cycle is the exhaust stroke, the exhaust valve being mechanically opened at the end of the working stroke and remaining open until the piston has reached the top, being carried up by the momentum stored up in the flywheels, thus driving out the burnt products.

A brief consideration of the fuels available for use in the internal combustion engine is of interest, as these cover a comparatively wide field. Those in most general use are gasoline, kerosene, alcohol, crude oil, illuminating gas, natural gas and producer gas.

Gasoline, which is the fuel in most general use for engines of small power, is obtained from distilling crude oil and is classified under two grades, known as engine gasoline of 76° and stove gasoline of 67°. This fuel has a heat value of about 18,000 to 20,000 B.T.U. per pound, and when used in an engine the accepted consumption claimed by all reputable engine manufacturers is about 1 pint per B.H.P. per hour.

Kerosene is also one of the fluids obtained from distilling crude oil, and is a lower grade than gasoline. It differs from gasoline in so far that it is not an explosive and will not give off vapor when exposed to the air as gasoline will; but, on the other hand, it can be readily vaporized. This fuel has about the same heat value as gasoline, but is not by any means in such general use for power purposes.

The use of crude oil has not so far become general, as while it is a remarkably cheap fuel, it calls for a special type of engine. A good many inventors have tackled the problem of using crude oil, but only a very few engines using this fuel can be said to be commercially successful. It has been found that, in order to utilize this fuel, it is necessary to use very high compression, amounting to 400 pounds per square inch or more, This constant pressure of 400 pounds per square nch, coupled with the further liability of a sudden further rise in

pressure, together with the weakening effect on the metal due to the high temperature which also varies within wide limits, all tends to frighten probable users, and one or two disastrous accidents to engines using this fuel would indicate that handling this type is somewhat in the nature of monkeying with gunpowder.

Illuminating gas is an excellent fuel for gas engines, and in an engine will develop a horse power on a consumption of from 15 to 18 cubic feet per horse power hour. Unfortunately, however, this fuel is only available in cities and large towns.

Natural gas is without question the best of all known fuel available for the internal combustion engine, and will develop a horse power on a consumption of from 12 to 13 cubic feet per horse power per hour. Natural gas is probably the cheapest known means of generating power, and it is unfortunate that it is only available in certain sections and cannot be used everywhere.

Of all the fuels available for the internal combustion engine producer gas is undoubtedly the most promising, from the fact that the fuel used is generally available, with the result that producer gas is coming to the front in nearly every part of the globe as a serious rival to every existing known form of generating power. A discussion of the possibilities of producer gas would have to be made a subject of a paper by itself and is altogether too comprehensive to deal with in the scope of the present paper. It is simply necessary to observe that we have only touched the fringe of development in this country, and while it has received a temporary setback in this territory, due to the development of electrical power, it is very doubtful if long distance electric transmission can eventually compete with producer gas, as it is important to note that all comparisons of cost have been based on the cost of coal as fuel. The use of coal, however, is entirely a side issue, as it is important to note that there is no known fuel not already in a gaseous form that may not be converted into gas through the agency of the producer, and if we are to follow the development in the use of producer gas in Great Britain and on the Continent of Europe, it would seem to be only a question of time when the garbage collected from the streets of our cities, the waste products of many of our large industries, that at the present time are going to waste, or costing large sums of money to get rid of, will be converted, through the agency of the producer, into useful energy for the distribution of power and light at a very low cost.

A paper of this nature would not be complete without a brief reference to some of the applications of the internal combustion engine. One of the most important of these and probably the most widely apparent to the general observer, is that of the mechanical propulsion of vehicles. The moderate size, high power and general convenience of the internal combustion engine burning gasoline, or other light hydrocarbon fuels, have rendered it specially applicable to this service, and if anything were needed to convince the general public of the practicability of the generation of power by the direct combustion of the fuel in the working cylinder, the modern automobile should furnish that demonstration.

As a means of transportation, when you stop to consider that the small gasoline engine applied to a motor cycle, the entire outfit weighing a little over 100 pounds, is capable of carrying a man for over 100 miles through all kinds of roads and grades on a consumption of 1 gallon of gasoline, we can appreciate the possibilities of this form of power in the direction of cheap transportation.

Some years ago, in a paper read before one of the engineering societies, the writer ventured the statement that, if the solution of mechanical flight were ever to be reached, the internal combustion engine would play an important part in that field of research. The very recent remarkable cross-channel flights of Messrs. Bleriot and Rolls, and the still more wonderful long-distance flight of Paulhan from London to Manchester, are striking tributes to the reliability of the modern internal combustion engine and should materially assist in setting at rest any prevailing doubt that the gas engine is more or less unreliable.

In the matter of durability, one instance out of several which have come under the writer's notice may be of interest, our Company recently receiving a letter from one of the leading railroads in the United States, stating that they had in use a 25-horse power Fairbanks-Morse engine, the records showing that this engine had averaged 21 hours per day for 7 years, with only 1 hour's delay due to water getting into the gasoline tank pit and freezing the tank and pipes. During that time the engine has had but 2 sets of piston rings and two igniters. These are all the repairs that have been required.

Remembering the rapid strides and remarkable achievements which the internal combustion engine is making in the field of transportation, we surely have some grounds for being confident and enthusiastic regarding its assured future and possibilities in industrial life. We have just seen that the gas engine was early in the field, but for some reason—and, by the way, probably no one is in a better position to explain the reason than the members of this Association—the gas engine for industrial work has not kept pace with the development in transportation and has suffered considerably from the competition of electric power. When it is remembered it very seldom happens that the gas engine does not prove more economical than electric power, the question may fairly be asked as to why they are not more generally used.

If the writer may be allowed to suggest at least one reason, it is evidently due to the lack of interest and aggressiveness on the part of many of our gas companies. The remarkable development of electric power is undoubtedly largely due to the aggressive enterprise and educative campaign carried on by the various electric power and distributing companies. One has only to refer to the daily press to note the incessant effort on the part of the electric companies to educate the public to the use of their commodities. On the other hand, is it not a fact that we find little or no effort made by the gas companies along similar lines?

If it were possible to present here in detail the different industries to which gas power has been applied and could be applied, the result would show an extraordinary array covering every modern industry. There are very few industries indeed where power cannot be utilized, and in nearly all cases with decided advantages in the way of labor saving and economy to the consumer. For instance, take the baking industry, which is a field for the introduction of small power, particularly adaptable for gas where heat and power are both desirable. It is a well-known fact that a power-driven dough mixer with a given amount of flour will produce more bread than when mixed by hand, besides making better bread. In fact, the saving is sufficient to eventually pay for the necessary machinery. This is only cited as a single example out of many as possible.

Of the many means available for transmitting power no one method is universally applied. Each has some peculiarity which renders it especially adapted for some particular situation not possessed by the other and is, therefore, so selected. For short distances solid transmission is used, such as shafts, gears, etc., and are almost of universal application. Greater distances bring into play successively belts, chains, ropes, etc., the whole series forming a purely mechanical means of transmitting power by the direct transmission of force through a solid medium. It is only a short step from mechanica. transmission of a force against a resistance as a means of transmitting power to the various other methods available. With the development of the air compressor there became available a more economical and flexible means of transmitting power, and compressed air, power-transmission systems, have become quite common, principally where small amounts of power are required, such as to operate tools, drills, hoists, etc.

Simultaneously, with the evolution of power transmission methods, with their different adaptation to special situations, electric progress has been very rapid, and electrical methods of transmitting power by reason of their adaptability and comparative freedom from limiting distances, have enabled it more or less to outshadow all competitors. Electric power transmission is equally feasible through a few feet or very many miles, although, of course, with somewhat unequal losses, and many small amounts of energy or the enormous output of our great waterfalls without difficulty. Electrical transmission by reason of its good features has brought the stored energy of nature from waterfalls to industrial communities. It has likewise removed innumerable shafts, belts, etc., from our factores. So successful indeed has been the application of electrical apparatus to the transmission of power that among engineers it has come to be regarded as the best means of transmitting power.

But it is well to bear in mind that no matter how good a method or piece of apparatus may be, the history of all engineering progress seems to indicate that some time and somewhere a better one will be found, if not better for all applications, at least better for some. Engineering practice really consists in the process of differentiation, applying the principle that "what is best in one place or time will not necessarily be so in another, or that something new may always find a useful field if essentially good."

In the development of the natural gas fields in the United States there were laid very extensive pipe lines for transmitting gas to towns and cities to be used for lighting, heating and power purposes. As the gas wells ran out, and as the cities and towns were equipped

with apparatus requiring natural gas, it appeared to be more economical to seek distant wells and transmit the gas than to substitute for it anything else. Thus there have grown up in the natural gas fields long distance pipe lines for handling natural gas; and for the sake of economy, transmission is effected at high pressure, this pressure being usually maintained by the gas engine driven air compressors. What was primarily intended to be a convenience for postponing the inevitable has proved to be a practical method of transmitting power by the concentrated energy in the form of gas fuel in pipes.

Apart altogether from the economy of the gas engine for power purposes, there are some points decidedly in favor of a pipe line for transmitting gas power. There is practically no danger of a break in a well laid pipe line, whereas, at the present time, there are constant interruptions and more or less danger in the case of overhead electric transmission lines carrying electric current of very high voltage and exposed to the vagaries of wind and weather. In the case of electric transmission systems, the rotary motion is converted into electric energy at the dynamo with a loss—transmitted over lines with another loss, and converted back into rotary motion at the motor with a still further loss. Furthermore, many manufacturing plants require heat, and there are now available apparatuses whereby the waste heat from the exhaust and cooling water can be utilized, further adding to the advantages and economy of the gas engine.

I have endeavored to present in this paper a calm statement regarding the present position and the possibilities of gas power, and to avoid making any extravagant claims for this excellent form of power; but if we are to have cheap power why not have the cheapest available. What would seem to the writer to be most required at the present time is hearty co-operation between the various gas companies and the manufacturers, so that the public and prospective users may be properly educated to the many advantages which accrue from the use of gas as a means of cheap power.

Discussion.

The President—I am sure we all listened with much interest to Mr. Fraser's paper. What suggested itself to my mind while Mr. Fraser was reading was that, in view of its efficiency and apparent economy, especially is towns where natural gas is available, it is strange that gas engines are not more generally used; for I think I understood Mr. Fraser to say these engines reach their highest point of efficiency running on natural gas, while it is also capable of taking an important place in manufacturing centers where industrial gas is used. This has been an education to me. We must be very ignorant of these facts in Montreal, for I don't think we have six gas engines on our gas list in that city of about ¼ million population; it seems to be replaced there by comparatively cheap electric power. I don't know how it is in other cities. I should like to hear a discussion on it.

Mr. Hewitt - Mr. Fraser has given us a splendid paper and pointed out many important things which we had scarcely realized. Away back in the early days the Consumers Gas Company, of Toronto, bought and installed in Toronto, what was then considered a good type of the Otto engine already referred to, made by the Doty Company, of Toronto. There were two reasons why these engines were not fully successful: First, because of many imperfections in the engine; second, insufficient knowledge on the part of the people who tried to run them. I have watched with much interest the later development and improvement of the gas engine. In Philadelphia the U. G. I. Company has about 1,500 gas engines working. An expert is employed whose duty it is to inspect and look after these engines regularly, to see that they are properly attended to and kept working. When a consumer wants to buy an engine, and has not the money to pay for it, the Company will install the engine and provide easy terms of payment. They are not themselves manufacturers of engines, but believe this is good business. They surely are on the line that will succeed. We have something like 200 gas engines on our line in Toronto, and as an illustration of the economy of this class of power, we took 23 gas engines, secured the statistics from the people who were using them, and it was shown that the annual saving as compared with electricity was $60 per horse power per annum. This was on the basis of a 10-hour day, and the actual number of working days in a year. These figures were taken just to get at the facts, not to boost the sale of gas engines. I think this paper has come before us at an opportune time, and we are deeply indebted to Mr. Fraser for the very careful manner in which he prepared it. I have never heard a better one.

Mr. Dion—What are the electric rates in Toronto? They must be excessive.

Mr. Hewitt—The rates are as low as 1½ cents and as high as 20 cents.

Mr. Dion—I cannot imagine, even if you produced electric power at less cost, how you could save $60 a year.

Mr. Hewitt - These are figures furnished by the consumers themselves, not by our Company.

Mr. Dion—I do not know what the rates for electric power in Toronto are, but I have some idea. Take it in our own city, where it is sold in small quantities to 1, 2 and 3-horse power engines with a maximum rate of $25 per year, you cannot save $60 there. [Laughter.] There are other places where the power is as cheap, not many I suppose; some are a little higher. In Ottawa we are interested in both gas and electricity. The writer of the paper said, one reason why electric power was so favored was on account of the aggressive policy of the electric companies. That may account for it to some extent, but the little or no attention required by an electric motor, after you pull the lever, in my opinion is not one of the least reasons for the popularity of electricity as a power agent. The writer referred to producer gas. Now, while it costs very little to install a motor, the initial cost of a producer gas plant is extremely high. If producer gas is to compete, the first cost has to be reduced considerably. Another point touched on - it has no bearing on the subject—was gasoline engines. The writer stated it would take one pint of gasoline per B. H. P. per hour. Is that right, Mr. Fraser?

Mr. Fraser—That is correct.

Mr. Wallace—I would like to refer to the point touched on, that has to do with the non-aggressiveness of the gas companies. I just wish, Mr. Hewitt, that they had some of our customers in Quebec to deal with; you would have to be pretty aggressive to satisfy and hold them. I quite concur in what Mr. Hewitt said a few moments ago about ignorance of how to handle and run gas engines. It was my duty at one time to look after the repairs to some of them, and we looked on the gas engine as a "Plague;" in fact, when we saw a person coming to have his engine repaired we would sneak out of the shop. However, I wish to congratulate Mr. Fraser on this excellent paper. The gas engine to-day is not a toy but a mechanical machine, which, if intelligently handled and advertised, will furnish a broad field for increased consumption.

Mr. Coate—I should like to add a word on this subject. Mr. Keillor, Mr. Dunderdale and myself have had some experience in the handling of gas engines in England, Australia and New Zealand; but during the 16 years I was in Ottawa I was not able to get in a single gas engine. Of course, gas was $1.10 in comparison with water power electricity. Unless you can get the price of gas down to the level they have it in Toronto it is pretty hard to sell them. I was much impressed with the remarks of Mr. Hewitt, and surprised to know they have placed so many gas engines in Toronto, for I did not think an equal number was in use in the Dominion; but, as Mr. Wallace remarked, there is a great field for them if properly developed, especially if one can get the gas down below the dollar mark—I know I will never be able to do it. I heard the other day that gas was somewhere to be put in the holder at 25 cents per 1,000. I hope it is true; but, like the Scotchman, "I ha' me douts." [Laughter.] I wish to thank Mr. Fraser personally for the very interesting paper he gave us; and, may I just say, in conclusion, I was reminded while he was reading it of the story told of an eminent Professor in the Old Country who was lecturing on "Expansion by Heat," when a humorously inclined student in the back of the hall asked the lecturer if that was the reason the days were longer in warm weather than in cold? [Loud laughter.]

Mr. Carter—I would like to mention something which came under my notice in Manchester, where they are making electric power cheaper there than we are. In one plant they have 10,000-horse power all in small units. I think you will agree with me they are making some headway there. Their power is generated by steam, and surely we ought to be able to equal or go one better when we have water power, We have two plants in Guelph, furnishing gas at $1 against electricity at 3 cents.

Mr. Dion—It is a strong talking point that with a motor you only have to move a lever and there is no further trouble

Mr. Keillor—I would like to know whether you can give us any information as to how a reduction in the B.T.U.'s would affect the consumption. The Association has the subject of lowering the B.T.U.'s of the gas under consideration. Of course, we know you can use producer gas as low as 150 B.T.U.'s, but would a reduction to say 500 B.T.U. affect materially the consumption?

Mr. Fraser—In the instance of gasoline, which runs about 850 to

900 B.T.U.'s, in practice we find that 50 to 60 pounds compression is about all you can carry safely, but with illuminating gas carrying 630 B.T.U.'s we can increase the compression to 150 pounds per square inch, accordingly, so the matter of compression enters into the question of consumption, for the consumption is about in proportion to the B.T.U.'s. It might be possible to increase the compression without increasing the consumption.

Mr. Wallace—I would like to challenge Mr. Keillor's statement that where power is on all day long, electricity would be cheaper than gas. I am not prepared to admit that electricity can beat gas at any stage, or under any circumstances as prices go to-day.

Mr. Hewitt—Is it not a fact that, with the price of gas at $1, and electricity at 2 cents, they would be about equal?

Mr. Keillor—Whether electricity would be cheaper than gas in any particular case depends entirely upon the prices of either or both. I should say that $1 gas would easily beat electricity from 2 cents per kilowatt up, but at ¾ cent to 1 cent, it is a tough competitor; that is, for continuous use, 10 to 12 hours a day. On the other hand for intermittent use, gas would certainly be cheaper than electricity under almost any circumstances. The 200 gas engines in Toronto are only the ones supplied by the Consumers Gas Company, not taking into account those running otherwise; but, without seeing the figures and knowing something of the returns, I cannot understand how $60 a year could be saved.

Mr. Carter—Are these definite figures, or are they just agent's talk? Agents are very clever, and I take off my hat to you; but can we get at any definite figures in regard to the comparative cost of producer gas? Or are we electric people off our bases?

Mr. Keillor—I am sorry I cannot throw any light on the comparative cost figures. We know a great deal of difference exists in the cost of both gas and electricity in Canada compared to what there is in the Old Country. In some English towns the price of gas is only ⅓ that which it is in Canada. In some places they charge 40 to 45 cents per 1,000 feet for manufactured gas and 4 to 5 cents per kilowatt for electricity, whereas, in this country electricity is sold as low as ¾ and 1 cent per kilowatt, and gas at $1, 75 cents, or less, as the case may be. Take the case Mr. Wallace referred to, at our own works, where we have a coal hopper run by a gas engine. This runs only intermittently, and we find it very economical, but if it were running constantly, say 10 to 12 hours a day, then it might be cheaper to use electricity at 1 cent per kilowatt. I should like to ask Mr. Fraser what kind of gas he has in mind when he put the consumption at 15 to 18 cubic feet of gas per horse power per hour? Also the number of B.T.U.'s? I think you mentioned 630, Mr. Fraser.

Mr. Fraser—I had reference to illuminating gas of 630 B.T.U.'s.

Mr. Buskard—My experience is that gas engines on continuous use are cheaper than electricity. I have 28 of them in Hamilton, from 4 to 20-horse power, under the same conditions that I have used electric power, and the gas engine to operate costs only ⅓ the price of the electrically operated motor.

Mr. Coate—There was a reference to making bread by gas power in Mr. Fraser's paper, I would like to have that repeated, please.

Mr. Fraser—The point I wanted to make was the advantage in opeaating a dough mixer, for instance, by power, over hand-operated machines. Much better results are obtained. Take a certain quantity of flour and you get more bread when it is mixed in a power machine than when mixed by hand; get more loaves from the same quantity of flour.

Mr. Carter—The real point is the comparative cost between gas and electricity for intermittent use, as I understand it.

Mr. Fraser—Yes; the mixer would probably only be running about 15 minutes to mix an ordinary batch of bread run by a gas engine; you also get a better quality of bread, besides more of it, as well as saving labor. The same thing applies to the making of ice cream. There is no question about it that ice cream made by power motion is very much superior to ice cream made by a hand-operated machine.

Mr. Dion—I can quite understand that, because ice cream is sold by bulk, but I cannot see the difference it would make in bread; that is sold by weight.

Mr. Carter—It takes in more water.

Mr. Dion—I would like to ask whether the figures given by Mr. Hewitt were simply for the gas consumed, or whether they also included cost of attendance?

Mr. Hewitt—The point I intended to bring out was that the gas companies must undertake the care and maintenance of these engines—see that they are given proper attention and are kept in perfect condition. The operation is nothing if they are kept in proper working order.

Mr. Dion—Your figures do not include attendance.

Mr. Fraser—No.

Mr. E. H. Gurney—In our plant we riddle our sand in the foundry by gas power, and although we make our own electricity we have decreased the cost considerably by using gas. I think if the advantages were brought before foundrymen in the proper way there would be a good field for gas engines.

Mr. Keillor—That is good, practical illustration.

Mr. Buskard—I have a good deal of experience since 1896 with gas engines, and would like to say gas power is the most economical power you can use, save water. Providing you have a perfect mixer and a perfect sparker on your engine you will have very little trouble with it, and it will cost you very little for operation or repairs. I run my engines for $4 a month on natural gas, and although I have 20 engines working in Hamilton I have only spent $5 for repairs in 10 years. I make my own mixers and sparkers and they never miss fire from one year to the other. Don't blame the engine if you have trouble with starting it and running it; blame the designer. The mixer now generally used on the small gas engines is not a mixer proper, for the index valve has to be so regulated to do the work of the mixer, which, when not set within the fraction of an inch, necessitates turning the crank, and, I may add with great difficulty, before the engine can be started. In many cases with such difficulty and repetition that the operator is exhausted. This should not be; a man is not a horse! [Laughter.] The sparker used also caused a lot of unnecessary trouble, the make-and-break spark causing the points to hammer together, with the result that carbon or other foreign matter accumulating in the cylinder becomes packed onto the points, which in turn become carbonized, thereby greatly decreasing the efficiency of the sparker. The compression valve now in use on the side of the cylinder, and which is supposed to regulate the compression, is in my estimation a detriment, and acts directly to the disadvantage of the mixer. As, for instance, the operation of the crank causes the piston to create an influx of gas and air in a fixed proportion through the mixer. Again, when the piston is in the act of of passing the valve the purpose of which is to relieve the compression, I find that the piston at this point has a tendency rather to draw a further quantity of air into the cylinder, which offsets the required proportion of gas and air, and the result is that when the piston returns, it forces this proportion of gas and air out through the cylinder valve and a uniform quantity and proportion of gas and air cannot be maintained. A gas engine should and can be so constructed that any person with ordinary knowledge should be thoroughly capable of properly caring for it. The mixer should be as perfect as the generating properties of the steam boiler, for the mixer is, in effect, the boiler of the gas engine. It should and is possible to regulate the compression at from 1 pound upwards, to its limit, without undue exertion on the part of the operator in starting the engine. By having a perfect mixer which will draw the charge to the full length of the stroke, and discharge the excess gases through the exhaust valve to the limit of compression, the energy required to start the engine is greatly decreased. The sparker should be made so that the least friction possible would be created while in action, and so that one spring will not pull against the other, and constructed of material that will not be affected by the heat. It should also be self-cleaning, with short contacts and throw the arc in a similar manner to that of the lightning flash, and work in perfect order for at least 2 years. The gas valve should be so constructed that, when the engine is turned over, it would be possible to obtain the proper proportions of gas without regulating the index valve to within the fraction of an inch. The engine builders of to-day do not seem to realize that in the lighting system a perfect mixer is to be found, and that the principles upon which it works should be applied to the gas engine if the best results are to be obtained. There should be a standard rule as to the sizes of valves in their relation to the horse power of the engine. By having large valves made of hard steel, and not of the same metal as the seat of the valve, I have found these valves will seat themselves and run for years. The ones we see to-day on most of the engines are like egg shells. [Laughter.]

Mr. Keillor—Do you consume 16 to 18 cubic feet of gas per horse power?

Mr. Buskard—Less than that; I only use 8 to 9 feet. I run on 68 cents a day, using artificial gas.

Mr. Hewitt—You get better results than any other person I ever heard of.

Mr. Buskard—Why cannot you do it if you have a perfect mixer

and sparker? Gas engine manufacturers often follow some other person's ideas and do not use their own brains. Another thing about them is, they over-rate their engines. There are engines in Hamilton to-day sold for 6-horse power that will only show 3-horse power. I know a man who sold one for 15-horse power which would only develop 8.

The President—The discussion this paper has evoked I am sure must be very gratifying to Mr. Fraser. Like Mr. Choate, I was not aware there were 200 gas engines in Toronto. I did not think there were so many in the Dominion. I am also surprised at the statement made regarding saving $60 a year. I would like to sell electric power in Toronto. [Laughter.]

Mr. Philip—At the present time we are tied up for power in Berlin—our gas engines are overloaded; but, of course, the town does not want to put in any more in view of the Niagara power which will be available shortly. During the month of April our steam generators burned $1,400 worth of coal and only produced ¼ of the power we made on $500 worth of coal with producer gas. Perhaps other plants are more economical than this one. We have high-speed engines, running against 5-pound back pressure, which affects the economy somewhat. We have the producer made by the R. D. Wood Company. The last time the fire was out was the 2d of January, 1910, and they had not been out up till then since 2 years ago last March. They run 24 hours a day all the time. You can shut them off. Our holders will run the plant 4 minutes; that is the limit. Now, that is pretty reliable, running night-and-day all through. It is no imagination; we have nothing else to make "juice" and keep the power on. Then, take with illuminating gas. If you are running on a fixed quality (though in Berlin we are "running pretty close to the wind" sometimes) your engines will run uniformly with just as little trouble as a water-wheel. Your troubles are very slight. Our ignition troubles are easily overcome, as we change our igniters in 40 seconds. These are little tricks which the "Boys" find out for themselves. As far as hydro-electric power goes, I am afraid it will never be satisfactory. There really is nothing like having the control of the power at your own door. Take the T. Eaton Company, Toronto, I suppose their power costs them as high, or higher, than any other concern in Canada, perhaps three times as high; but it is worth that much to them to have it under their own control—no shutting down everything there in a thunderstorm. When we of Toronto, London, possibly Windsor, are dependent on Niagara power, it will be affected not only by local storms, but by storms over an area of 150 miles; and the troubles will be manifold. We all know what trouble there is now in our own plants, with big motors jumping on-and-off, and you can imagine what it will be when everyone is trying to get on at once after an electric storm—there will be lots of fun. I am sorry, Mr. President, I did not hear this paper, but I will write the author my criticisms later on.

Mr. Wallace—Has any member had experience with gas of a uniform quality and different specification, and whether it makes any difference?

Mr. Philip—If your engine when running on coal gas is giving the maximum economy, and you change over to water gas you will get rapid back-firing, but the compression will be doubled; it will be hard to get proper ignition. Your compression should be lower and your hydrogen higher, the same as in producer gas. Our producer will run from 80 to 140 compression, it varies, sometimes running 125 to 130 B.T.U., but that may be excessive. Then we have troubles with ignition, back-firing and blowing out the manifold. That does not affect the working of the engines, but does affect the natives—for it is like the Battle of Pardeburg. [Laughter.]

The President—To Mr. Fraser I extend the Association's thanks for his interesting and valuable paper. [Applause.]

Lecture by Mr. Macbeth.

The President—I will now call upon Mr. Norman Macbeth, for his paper, or illustrated lecture on "The Importance of Illuminating Engineering to Gas Companies."

Mr. Macbeth threw several pictures on a screen to illustrate the uses to which gas and electricity can be put, such as an electric fireless cooker, coffee percolator, a gas heater for place heated by a 16-candle power gas mantle. He also showed an "Illuminometer" for measuring light, and what was of very great interest to all those present, a "Chart of Cost Data," showing energy cost for equal illumination in any building.

Mr. Macbeth—This is, as far as I know, the only chart of the kind that has not been ripped up the back. If any person tries it, I have plenty of data to soon make them take back water.

The President—Have you got copies of that chart, Mr. Macbeth?

Mr. Macbeth—Yes; I shall be pleased to furnish copies of these, or any further information to anyone of the members who care to write me. I am working all the time in the interests of the gas men.

Mr. Hewitt—Mr. President, if Mr. Macbeth had not done anything else but call our attention in his speech to this one fact it would, I am sure, call forth enough gratitude to repay him for the trouble he has taken. That is that gas companies frequently give consumers more light than they actually require, so that while electric companies sometimes replace gas lighting with electricity at equal cost, they do not give anything like equal illumination. It is for the gas man to be judicious in estimating the amount of illumination actually required by consumer, and not cause him to waste money in non-effective over-illumination.

The President—We have certainly listened to a very interesting lecture, and Mr. Macbeth is to be complimented on the great fund of knowledge displayed. He certainly is on top of his job. What struck me forcibly was the statement he made that "He was working for the gas men." Personally I did not know that any person or company was doing that; and I think we should take advantage of the Welsbach Company's effort, which is in reality a specialty.

Mr. Macbeth—Perhaps I did not make myself clear on that point. I may say that, in the department of which I have charge at Gloucester, we will take up any installation any person cares to send us, with some particulars—the more particulars the better—or a sketch; does not matter what kind of a sketch. We are neither proud nor particular (we get them on the back of an old envelope sometimes), as long as you tell us about what you require, whether large or small units, whether you are up against competition with electricity, etc. I am sure I shall be very pleased to hear from any person here. Write to my department. If you are not sure whether I can or ought to do it, take a chance anyway. We are in business to help you and will do what we can for you.

Mr. Kellum—I may say that all the other departments of the Welsbach Company are feeders to Mr. Macbeth's department, and if you forget his name, write the firm and it will reach him all the same.

The President—This is a very interesting statement, and I think you will hear from Montreal all right.

Mr. Dion—I think we have accomplished the object of these papers at the convention, and that we will leave here, as Mr. Macbeth stated, able to look at things from different points of view. If there is a lesson to learn, I think it is that, if the gas companies could afford it, it would pay them to have a specialist on illumination, that it would be profitable to get an illuminating engineer. I do not know that any of the companies have given much thought along that line, but the time will come when it will have to be done. You must show your customer what will best suit his requirements, explaining the lighting effect, not forgetting the costs of same. That is the way it strikes me, and I was wondering whether or not we have come to the time in our history when we should do something along that line.

The President—It would be hard to get men to do this special work.

Mr. Macbeth—The more intelligent fitters make the best men for this work, and I believe your fitters in Canada are better generally than those we have in the States. If you employ a fitter let him use the figures he gets on each job, then keep adding to them, impressing upon him that these figures are valuable, and giving him a couple of months to devote himself to this work, you will get very satisfactory results.

Mr. Dion—Do you consider that even the more intelligent fitters have sufficient education or development to absorb the knowledge necessary?

Mr. Macbeth—Of course, it is a gradual growth and by absorption.

Mr. Dion—My idea would be to employ a higher grade man.

Mr. Hewitt—In our experience the most successful solicitors are developed from fitters. It is a mistake to think they have no brains.

Mr. Dion—I did not mean to say they had no brains.

Mr. Macbeth—I do not know whether any of the companies represented here have meetings where your men get together with yourselves, but if you do, allow me to suggest that you also invite your fitters. When I was in one U. S. city a short time I learned that five of their best salesmen were men who had previously been fitters. They could sell goods that remained sold, and that is what we all want.

The President—Our only regret is that time will not permit us to continue this discussion further. We have other engagements, which, of course, we must keep. On behalf of the Association I wish to extend to Mr. Macbeth our hearty appreciation of the paper he has

given us, and the expression of willingness to help when wanted. [Loud applause.] I will now declare the meeting adjourned until 10 o'clock to-morrow morning, when the President-elect will convene you personally.

MORNING SESSION, JUNE 11.

Mr. Arthur Hewitt, President elect, called the meeting to order pursuant to adjournment, and said: I do not know myself that we have much left to do this morning. Mr. Keillor, with his usual generosity, after doing most of the work in connection with the report which has been prepared for the Association, asked me to read it to you—and you know when Mr. Keillor says do so and so, there is nothing for it but to do it. I might say it was intended that this report should be supplemented by a recommendation. It has not been drawn up, so we will have to leave over the discussion of that recommendation. I will now read the

REPORT OF COMMITTEE ON CANDLE POWER AND CALORIFIC VALUE.

To the President and Members, Canadian Gas Association: Gentlemen—Your Committee appointed to collect data as to the candle power and calorific value of coal and water gas supplied by gas companies and corporations throughout Canada, begs to report as follows:

We recall that, at the Convention held last year in Montreal, the paper and discussion on the "Candle Power of Gas" brought out the following facts and suggestions:

"That there had been no change in the Dominion Government statutes regulating the testing of gas and the candle power that is to be supplied, for 24 years.

"That during those 24 years the methods of using gas had so totally changed that three was no longer any necessity for gas companies in Canada supplying to consumers the quality of gas prescribed by the Gas Inspection Act 1886.

"That, in other countries, notably Great Britain and Germany, the regulations governing the testing of gas has been revised to suit the new methods of using gas and the candle power reduced.

"That in other countries more modern and efficient burners for testing the candle power of the gas had been adopted—notably the No. 2 Metropolitan burner and the old standard Argand burner discarded.

"That, in view of the fact that about 90 per cent. of the total gas made in Canada was now being sold for purposes other than flat or open flame lighting, it was suggested that tests be made in Canada of from 12 to 20 candles, for the special purpose of ascertaining the respective candle power and heating values of the gases lower than 16 candles, the idea being to obtain information which would guide the Association in recommending a reduction to a lower grade candle power gas which would still contain sufficient heating units for the all-round requirements of the consumers."

Following the lines indicated, your Committee decided to make these tests in Toronto, where coal gas and water gas are made, and a blend of the two distributed to the consumers, the tests to be made as follows:

1. For candle power, using the Sugg 16-candle standard and the pentane lamp; calorific value to be measured by the Junkers calorimeter.

2. For candle power, using the new No. 2 Metropolitan burner and the pentane lamp; calorific value to be measured by the Junkers calorimeter.

It was also decided by your Committee that the Association should be in possession of statistics covering the entire gas production of Canada, for the purpose of ascertaining first hand the total quantity of gas made, the candle power of same, and the proportions sold for heat and fuel, mantle lighting, etc.

Accordingly, a circular letter was mailed to every gas company in the Dominion that makes coal gas, water gas, or a mixture of the two, requesting they supply information the Committee desired on the form inclosed for the purpose. Returns were received from every company making coal or water gas, with the exception of two. The following is—

A.—A tabulated statistical report of the gas made in the year 1909, in cities and towns in Canada.

B, C, D.—Tabulated returns of the tests for candle powers, and corresponding calorific values.

A.

	Gas Made Cubic Feet.	Proportions Used For (1) Heat and Fuel, Cubic Feet.	(2) Mantle Lighting, Cubic Feet.	(3) Open Flame Lighting, C.F.	Candle Power Supplied.
Barrie	12,000,000	6,000,000	5,400,000	600,000	18.0
Belleville	20,200,000	10,200,000	7,500,000	2,500,000	19.3
Berlin	35,000,000	26,250,000	6,750,000	2,000,000	16.7
Calgary	27,000,000	20,250,000	6,750,000	.....	16.0
Cobourg	7,400,000	4,400,000	1,500,000	1,500,000	18.1
Guelph	44,000,000	26,400,000	13,200,000	4,400,000	17.5
Hamilton	101,000,000	53,500,000	38,000,000	9,500,000	16.0
Ingersoll	12,000,000	6,000,000	4,800,000	1,200,000	16.0
Kingston	40,000,000	20,000,000	20,000,000	.....	20.0
Listowel	3,000,000	300,000	2,250,000	450,000	19.0
London	192,000,000	115,200,000	67,200,000	9,600,000	17.5
Montreal	1,459,000,000	875,000,000	510,600,000	75,000,000	17.4
Napanee	5,00 ,000	2,500,000	2,500,000	.....	20.0
Nelson	7,100	5,000,000	2,100,000	.....	18.0
Owen Sound	18,000,000	10,800,000	3,600,000	3,600,000	16.0
Oshawa	4,000,000	2,000,000	1,840,000	160,000	17.0
Ottawa	126,500,000	113,850,000	12,650,000	.....	16.5
Peterboro	17,000,000	16,150,000	850,000	.....	18.0
Quebec	120,000,000	72,000,000	45,600,000	2,400,000	18.0
Stormont	4,000,000	1,600,000	2,000,000	400,000	18.0
St. Catharines	18,650,000	13,100,000	5,550,000	.....	18.0
St. John	36,200,000	1,800,000	30,800,000	3,600,000	17.0
St. Thomas	56,200,000	22,500,000	22,500,000	11,200,000	17.3
St. Hyacinthe	5,000,000	4,000,000	800,000	200,000	18.0
Toronto	2,226,200,000	1,113,200,000	667,800,000	445,200,000	19.0
Vancouver	123,000,000	95,900,000	27,100,000	.....	16.0
Winnipeg	245,600,000	184,000,000	49,300,000	12,300,000	17.0
Woodstock	30,000,000	15,000,000	14,400,000	600,000	16.7
	4,995,050,000	2,837,300,000	1,573,340,000	584,410,000	

	Cubic Feet.	Percentage of Total Gas Made
Total Gas Made in Canada, Exclusive of several Small Companies that Did not Send in Returns	4,995,050,000	100
Proportions used for:		
(1) Heat and fuel	2,837,300,000	57
(2) Mantle lighting	1,573,340,000	32
(3) Open flame lighting	584,410,000	11
	4,995,050,000	100

B.—*Illuminating Power and Corresponding Calorific Values.*—10 Tests each of Coal Gas, Water Gas and a Mixture of Coal and Water Gas.—Sugg's 16-Candle Power Standard, and Junkers' Calorimeter.

Test No.	Kind of Gas Used.	Candle Power Sugg's 16-c. p. Standard.	Calorific Value—Gross.	Calorific Value—Net.
1.	Straight coal gas	17.85	652.6	584.06
2.	" "	17.46	677.3	621.98
3.	" "	17.72	662.0	598.01
4.	" "	16.92	621.80	575.74
5.	" "	17.38	685.10	630.04
6.	" "	18.53	703.0	647.84
7.	" "	17.81	665 30	605.20
8.	" "	10.68	674.60	593.53
9.	" "	16.85	626.80	584.53
10.	" "	16.22	614.40	557.00
1.	Straight water gas	17.46	587.30	536.67
2.	" "	19.42	585.70	535.35
3.	" "	19.92	600.00	586.01
4.	" "	19.43	592.42	555.59
5.	" "	17.52	617.20	580.28
6.	" "	20.20	610.50	587.33
7.	" "	21.72	612.40	577.48
8.	" "	20.77	612.10	572.39
9.	" "	18.53	565.00	538.33
10.	" "	18.08	570.60	538.50
1.	Mixture of coal and water gas.	15.64	587.30	533.09
2.	" " " "	16.06	601.30	541.37
3.	" " " "	17.31	623.60	578.14
4.	" " " "	19.42	631.90	599.30
5.	" " " "	18.33	626.40	575.29
6.	" " " "	18.29	626.30	575.79
7.	" " " "	17.39	621.10	575.22
8.	" " " "	17.32	612.50	576.33
9.	" " " "	18.41	629.60	581.30
10.	" " " "	17.34	614.08	554.82

C.

Test No.	Kind of Gas Used.	Candle Power. No. 2. Metro Standard.	Calorific Value.—Gross.	Calorific Value.—Net.
1.	Straight coal gas	17.79	587.30	533.09
2.	" "	18.38	590.80	558.68
3.	" "	19.58	653.70	598.32
4.	" "	19.15	607.50	560.70
5.	" "	19.30	614.30	554.69
6.	" "	20.48	644.00	588.12

Test No.	Kind of Gas Used.	Candle Power. No 2. Metro. Standard.	Calorific Value. Gross.	Calorific Value. Net.
7.	Straight coal gas.....	20.74	667.60	611.65
8.	" "	21.40	639.80	586.52
9.	" "	21.11	631.70	575.60
10.	" "	20.54	621.00	565.34
1.	Straight water gas.....	22.48	605.10	554.34
2.	" "	22.83	604.10	557.15
3.	" "	23.53	625.00	592.36
4.	" "	22.91	614.40	563.82
5.	" "	25.10	612.40	577.48
6.	" "	21.94	570.60	538.50
7.	" "	21.70	565.00	538.33
8.	" "	22.09	590.80	558.68
9.	" "	21.37	598.30	593.65
10.	" "	23.68	610.50	587.33
1.	Mixture of coal and water gas.	21.06	624.00	610.19
2.	" " " "	21.15	638.90	589.70
3.	" " " "	21.92	668.40	603.13
4.	" " " "	22.59	634.70	592.91
5.	" " " "	22.60	609.90	572.67
6.	" " " "	21.59	621.30	569.91
7.	" " " "	21.63	610.50	576.29
8.	" " " "	19.85	632.20	590.54
9.	" " " "	22.09	626.40	575.29
10.	" " " "	20.54	623.60	578.14

D.—*Illuminating Power and Corresponding Calorific Values.*—15 Tests of Pure Coal Gas, using Sugg's 16-Candle Standard, and Junkers' Calorimeter.

Test No.	Sugg's 16-Candle Standard.	Calorific Value. Gross.	Calorific Value. Net.
1.....	11.76	575.25	538.96
2.....	11.87	548.20	501.69
3.....	13.83	603.90	546.76
4.....	14.32	607.50	560.70
5.....	15.56	610.40	575.57
6.....	15.83	633.30	577.59
7.....	16.06	627.30	557.62
8.....	16.17	632.10	571.57
9.....	16.71	644.00	588.12
10.....	17.27	639.80	586.52
11.....	17.81	665.30	605.20
12.....	18.03	633.10	579.38
13.....	18.28	648.00	578.92
14.....	18.68	674.60	593.53
15.....	19.00	669.00	611.30

From the tabulated statement "A," it will be observed that out of the total gas made in Canada 57 per cent. is used for heat and fuel, 32 per cent. for mantle lighting, 11 per cent. for open flame lighting. We desire especially to draw your attention to the small percentage used for open or flat flame lighting, 11 per cent., as compared with the large proportion used for heat and fuel and mantle lighting combined, 89 per cent. Compare these with proportions used for the same purposes in 1886, when the existing testing regulations were enacted:

	In 1886. Approximately. Per Cent.	In 1910. Actual. Per Cent.
Gas used for heat and fuel.....	15	57
Gas used for lighting by mantle burners....	nil.	32
Gas used for lighting by luminous or flat flame	90	11

These figures show how radically changed the conditions are to-day, in the matter of using gas, as compared with 1886. In 1886, when the Argand burner was adopted by the Government as the standard burner for testing the gas, 90 per cent. at least of the total gas sold was for lighting by luminous or open flame burners. This necessitated making high candle power gas, so that with the standard burner a light equal to at least 16 candles could be obtained, the gas being consumed at the prescribed rate of 5 cubic feet per hour. In 1886 the Government decided that gas companies would have to maintain a 16-candle standard, a regulation intended to protect the consumers who used those luminous flame burners against the possibility of getting poor light; but, remember, that was in 1886, 24 years ago. The Argand and flat flame burners were the only ones in general use then, and practically all the gas made was used by these burners. Now look at the changed conditions in 1910. Only 11 per cent. of the total gas made is now used by luminous flame burners against 90 per cent. 24 years ago. To-day as much as 89 per cent. of the gas made is being used for the combined purposes of heat, fuel and mantle lighting, in 1886, approximately 10 per cent.

Taking into consideration these changed conditions of using gas, it is evident that what the gas industry is called upon to supply to-day, and in the future, is not a "lighting" but a "fuel" gas. We do not push the sale of a single gas appliance nowadays that necessitates the making of high candle gas. The gas range, water heater, gas engine, industrial furnace, gas arc, gas fan, etc., can all be well served with a lower grade gas than that prescribed by the 1886 Act.

Turn now to the tabulated statements, B, C and D. It has already been stated that these tests were made for the purpose of obtaining reliable information based on Canadian practice to lay before the Deputy Minister and Chief Electrical and Gas Inspector, should the Association decide to recommend a reduction of the candle power or the substitution of a calorific standard in its stead. There is no doubt in the minds of your Committee that the calorific standard will eventually supersede the candle standard in Canada, but just how far the Government are prepared to go in the matter at this time we have no means of knowing. At any rate it is safe to assume that, when it is made known to the authorities, in the opinion of the Canadian Gas Association, a change in the statutes is necessary, in view of the radically changed conditions of using the gas, either a reduction of the candle standard will be granted or the candle standard will give place entirely to the calorific standard.

Two important facts are to be deduced from the tabulated results of the tests referred to:

1. That coal gas of about 13-candle power (Table D), as tested by the Sugg 16-candle standard, containing about 540 B.T.U. net, is sufficiently high in heat units for all practical requirements and the No. 2 Metropolitan burner.

2. The difference in the efficiency of the old Sugg, 16-candle standard burner, and the new Metropolitan No. 2, when testing gases lower than 16 candles, is very marked; but this is to be expected because whereas the Sugg standard is made to test 16-candle gas only, the South Metropolitan burner with its adjustments can be adopted to test correctly any gases higher or lower than 16 candles.

Respecifully submitted, ARTHUR HEWITT, JOHN KEILLOR, } Committee.

The President—This report has been prepared for the consideration of the Association, and Mr. Keillor or myself will be very glad to answer any questions regarding the methods of making these tests, or any other information you may desire.

Mr. Burnett—What were the proportions?

The President—The mixture taken was 25 per cent. water gas and 75 per cent. coal gas. This is as it should be in large cities any way.

Mr. Burnett—I do not agree with you; think it should be reversed.

Mr. Dunderdale—What type of burner were these made with?

The President—The tests were all made with the the standard Argand burner.

Mr. Dunderdale—No. 1?

The President—Yes.

Mr. Philip—It might appear to anyone not a gas man that the reason we want the standard changed is to benefit ourselves. In Berlin we have a municipally owned gas plant, and Toronto has practically the same. There are a number of municipal gas plants, and if we can get better gas with greater economy for the purpose required, the benefit accrued directly to the public. This report is very interesting, and I move a hearty vote of thanks to those who got the data together and made it report.

Mr. Dunderdale—Before putting that motion, Mr. President, I would like to know whether any person can give me a scale of depreciation in candle power of gas put in a holder when the temperature is 50° below zero?

The President—I think you have us there.

Mr. Dunderdale—I would like to know the decrease in illuminating power.

The President—We put gas in the holders at 60°, and our temperature at times goes from 10° to 12° below zero or worse.

Mr. Wallace—A paper was being prepared by a member of the American Gas Institute, which will be found in the "Proceedings" of their meeting. I will look it up and send it to you.

Mr. Keillor—Do you find abnormal condensations in the holder drips?

Mr. Dunderdale—Quite a bit.

Mr. Coate—I quite agree with Mr. Philip that this paper deserves our best appreciation and thanks, and I am sure we are all gratified and pleased with the result. I take pleasure in seconding the vote of thanks to Messrs. Hewitt and Keillor. [Adopted.]

Mr. Keillor—I thank you very much, gentlemen, for your kind acceptance of this report. So far as I am concerned it has been a labor of much interest and love.

The President—I thank you, gentlemen. The interest you have displayed amply repays for the cost and trouble taken. Mr. Howe will now read us his paper on

SOME RECENT INSTALLATIONS OF ARC LAMPS IN HAMILTON.

Recent improvements in the construction of inverted lamps led the Hamilton Gas Light Company to make a 6 months' test of twelve 5-burner inverted arcs placed in prominent stores in the city. This turned out to be so satisfactory that we decided to adopt in the future the indoor and outdoor inverted arcs for our free lamp scheme to the exclusion of all uprights.

The few remarks I have to make to-day will be devoted to a number of installations of both indoor and outdoor, 5-burner arcs we recently installed, and I take pleasure in handing round for your perusal—and to take home if you will—pictures of 3 or 4 installations which will give a general idea as to their appearance, the lamps being white enameled outside. I am sorry that the photographer who made exposures of several larger installations could not get the electrotypes prepared in time for this meeting. These, however, serve to illustrate two types of outside installations we have adopted: (1) The 5-burner inverted arc, suspended from a suitable pipe outside the store front; (2), the 5-burner inverted arc, suspended on ornamental boulevard posts on the sidewalk. In connection with the lat-

ter I have been successful in making contracts in the last 2 months for 45 outdoor, 5-burner inverted arcs on boulevard posts of the type shown on picture. Thirteen of them have already been erected, and are certainly a disclosure to the Hamilton business men. These are lighted up every night, all the year round, on a flat rate basis, lighting, extinguishing and cleaning being done by our employees. If any member here who is interested would like to see these boulevard post lamps in actual use at night, I shall be very glad to arrange to take them down to see them. Apart from the scheme of lighting by boulevard posts, we have been recently very successful in our adoption of the inverted arcs for indoor lighting.

I particularly want to say, with regard to the inverted lamps installed in Hamilton, that there is practically an entire absence of carbon formation in or around the mantles of the lamps. Contrasted with my experience in the States, where 30 and 32-candle gas is extensively used, my experience is that the inverted lamps in Hamilton are giving a very much higher efficiency in candle power and all-round general results, in addition to requiring less cleaning and maintenance. One could scarcely imagine there could be so much difference from month-to-month. The difference was so marked that I discussed the matter with the manager, Mr. Keillor, who says it is most assuredly due to the fact that we were making a straight coal gas, of not more than 16-candle power. The 16-candle power gas will work infinitely better in mantle burners than 20 or 25 candle gas. Inverted lamps of almost any type I know will work better with low candle power gas than with high grade candle gas; the high grade gas producing, as it does, too much carbon, which is very detrimental to high efficiency.

It has been generally believed by most gas company managers that free lamps and free maintenance are not good propositions for any gas company to consider.

This has been proven to the contrary by the Hamilton Gas Light Company, which started a campaign of free inverted lamps and free maintenance on and about March 1st, 1910, and up to the present date we have installed over 250. We found that the free lamp proposition we offer to the public has been the means of our success. We would not have been able to obtain any such volume of business on a rental basis. We furnish, install and maintain all lamps free. Our inspectors or trimmers inspect all lamps every 10 days, clean same and furnish the mantles necessary, and keep the lamps in good order. The lamps always remain the property of the Gas Company.

Our outdoor lamp proposition is as follows: We install all outdoor lamps, and piping for same, furnish the gas and man to light, extinguish and maintain same for $3 per month per lamp, or $36 per year per lamp. This gives the Company $24 per year per lamp for the gas consumed and $12 per year for its maintenance. We have over 50 outdoor Humphrey inverted arcs in actual use, which we have installed since April 1st, 1910. Each outdoor lamp is installed by contract for one year, to be lighted at dusk and extinguished at 10:30 P.M. every night except Sundays. One hundred lamps then would consume 2,400,000 cubic feet per year.

We have another proposition to which I would like to call your attention. Street lighting by lamp post of the ornamental, boulevard type, of which we have orders for 33 to be installed as soon as possible in the various parts of the business section of this city. Some are now being installed, and we expect to install over 100 lamp posts in this city before the coming September.

The President—On behalf of the Association I want to extend to Mr. Howe our appreciation of his paper. We cannot fail to be interested, as the Association is in convention assembled in the city of Hamilton, to see the local Gas Company recovering, as it is, some of the lost ground, making headway and looking forward to a successful future, which I am sure it richly deserves. Personally I have spent a good deal of time looking into this question of arc lamp business, and while our conditions are not the same as they are in Hamilton, I can fully understand it is a good paying proposition. Our prayer, I am sure is, that we may never have natural gas to contend with. This paper has been prepared for us at cost, and I am only voicing the sentiment of all present, I know, when I say we appreciate very highly what Mr. Howe has said to us.

Some Fraternal Acts.

The members were asked, through the President, if they would contribute something towards the "King Edward Memorial Hospital for Sick Children," in Hamilton, which was responded to most heartily.

On behalf of the exhibitors, the President was asked to make a presentation of a silver-headed umbrella and walking cane to Mr. J. B. McNary, of the Canadian Meter Company, Hamilton, for his untiring efforts on their behalf and for the part he took in making the exhibition the great success it was. Nor did the exhibitors forget Mr. A. W. Smith, Sec.-Treas., Canadian Gas Exhibitors, and his lady helpers. Mr. Smith was handed a purse of gold, and the ladies were presented with handsome brooches set with pearls.

Suitable replies were made by each of the recipients in expressing their thanks.

The President—There is no further scheduled business. Have you anything on for this afternoon, Mr. McNary?

Mr. McNary—The members were to be taken for a tally-ho ride, but I am afraid we will have to call this "joy ride" off on account of the rain. It would not be very nice to look down from the mountain upon our beautiful city a day like this, when the clouds are shedding tears. We also had arranged a trip to the meter works, but it would not be pleasant on a cold, damp day like this—you have meter troubles enough at home.

On motion, the convention was declared finally adjourned.

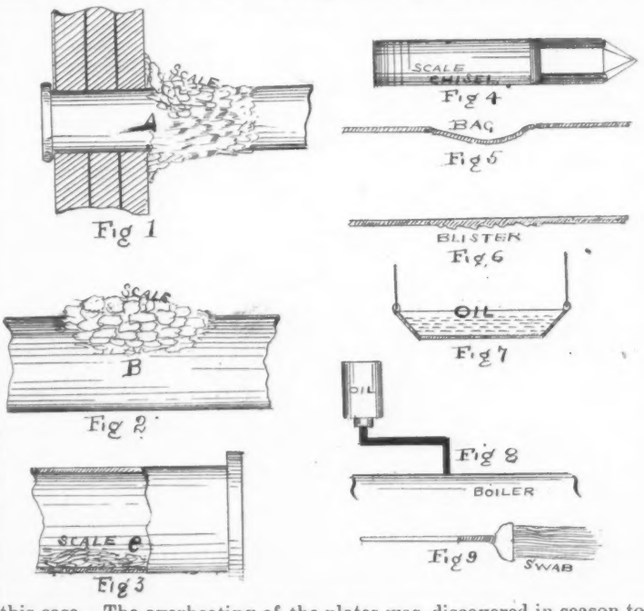
The Boiler and the Boiler Washer in and of the Gas Works.

[Communicated by "R."]

Some of the engineers of gas plants use oil too freely for the removal of scale from the interior of the boilers. Oil is, of course, quite effective in removing boiler scale, and can be used to very good advantage in many instances; but a great deal of judgment is needed in the selection and application of the oil under varying conditions of the scale in and the condition of the boiler. One has only to examine cases in which oil has not been correctly employed in removing scale from boilers to comprehend the need of care in the use of the oil. The writer saw a number of boilers in gas works in a bad condition, due to incorrect employment of oils and the use of patented compounds for getting rid of the troublesome scale. The latter is a bad thing and we cannot blame the engineers and firemen for striving to their utmost to take scaly matter out of the boilers.

It is hardly necessary to state that some of the oils employed as softening material for the hard, scaly substance left from the water in the boilers, is of a dangerous nature, for engineers and boiler room workers know that too well in numerous instances. In one gas works where careless selection of oils was made, the oil simply tended to harden the scale on the plate and tubes, due to the peculiar water used from the mountain courses. The oil might have been a success under other conditions, but the hardened matter collected and became impervious to the heat, and was discovered only in time to avert burning the plates and perhaps causing blistering and an explosion.

The oil scale in another gas works boiler proved almost as risky as magnesia scale. The thin oil scale collected at a potent part of the boiler and bagging commenced at once. Now, heat will pass through the magnesia or common boiler scale, but oftentimes cannot impregnate the oil scale, and overheating of the plates will follow, as in



this case. The overheating of the plates was discovered in season to prevent a disaster, however. Plates $\frac{5}{16}$ of an inch thick were in this boiler, yet the plates had drawn themselves out to a very slender thickness, due to the using up of the metal in the bagging, and a rupture was near when the defect was discovered

I saw a party put a lot of black oil into his boiler to remove the scale, and on passing there later on, was shown the burned plates resulting from the same. The black oil in this case penetrated the pores of the scale and formed a coating on the plates, which caused an insulation that prevented the water from cooling the metal and crystallized plates resulted.

Fig. 1 at *A* shows some of the scale packed about the tube in a boiler head. Sometimes the scale attaches itself on a tube, as at *B*. Then, again, we get the scale inside a pipe, as at *C*, Fig. 3. I found workmen, inside of boilers in some of the gas works plants, with cold chisels and tools chipping tediously away at scale formed as illustrated in these three views. The manholes were removed, and the steady chip, chip, chip, of the invisible engineer or fireman inside the boiler could be heard. A type of chipping tool is shown in Fig. 4. A bagged place in a plate is shown in Fig. 5 and, a blistered plate in Fig. 6.

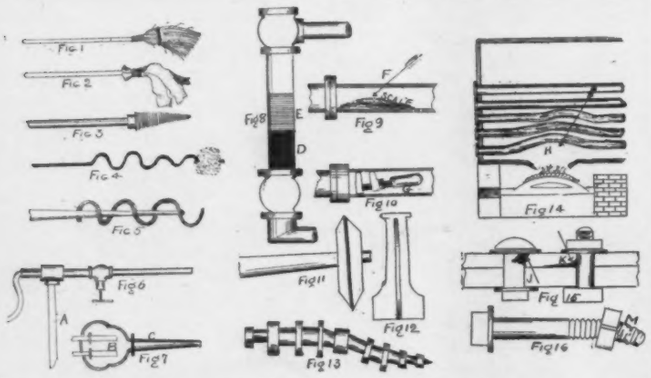
In a country plant, where the engineer was the fireman, machinist and general all-round man, the oil was admitted to the boiler by suspending a pan of it inside the boiler, above the tubes, by supporting the pan with wires, as in Fig. 7. In another place a party rigged up an oil-feed for boiler scale oil, as in Fig. 8, consisting of the 3-gallon tank supplied with the lead pipe. Fig. 9 is one of the oil swabs useful for swabbing purposes.

I consider the only safe way is to first get a sample of your water, put up the sample in a convenient bottle and send it to a chemist for analysis; or, better still, send the water sample direct to a reputable manufacturer of boiler cleaning compounds. The chemist of the

company will determine what your boiler water is, and he will recommend a compound with the necessary proportion of potash in its composition to neutralize any acid that may exist in the water from your supply. If you buy patented mixtures, you may hit it right and you may not. If you do, all will go well; if not, you will have some bills to pay for new plates and tubes. There are excellent oils and compounds on the market for completely removing boiler scale, but the difficulty consists in getting the right one for your particular use. The chemist is the man who can help you out.

AND THE BOILER WASHER.

The boiler washer is a far more important man than he used to be; in fact, not long ago there were no regular boiler washers, the firemen and sometimes the engineer taking a hand at boiler washing, nevertheless, the modern boiler washer often cleans boilers in the little plant. The boiler washer, who is his own manager and goes from plant to plant to wash out boilers, caters to the small establishment where no special man is employed for this work, but in the larger plants men are, of course, regularly employed with stated duties and fixed responsibilities in the boiler washing line. These men possess special equipment with which to work. The men are trained in caring for and cleaning boilers, and are expert in their methods of operation. They know how to crawl into a boiler and get busy, being slender enough, as a rule, to pass through small manholes. A fat man has no business to enter a boiler with a riveted manhole, for the reason that an accident might happen and he might not be able to get out. A boiler washer tells me that only a few months since he was burned severely by his chum turning on the steam while he was in the boiler, the chum supposing that the boiler washer had come out. Errors of this kind will happen, although they should not. Then, again, the boiler washer of to-day has to go beyond the boiler proper. He is supposed to examine the tubes and clean them, and he must get under the grate bars to examine and clean out the lower part of the furnace. He must squeeze into the ashpit and do some cleaning there. The stack cannot be overlooked



The gauges must be inspected; in fact, there is quite a range of work even for the boiler washer.

In the illustrations are shown some of the fittings used in his daily work. The broom, Fig. 1, is to be discouraged, yet its use is common, for want of something better; particles of brooms are often found stopping up pipes after a cleaning with such things. The mop, Fig. 2, will work in handy to swab off the tubes when you have freed the scale matter from the metal. The cone-shaped device, in Fig. 3, is a long handle with disks of sheet metal secured thereupon; the nose of this device is pushed into pipes for the purpose of cleaning them of foreign substances. Then there is use for the spiral steel rod, Fig. 4, with sponge on the end, and likewise for the queer affair shown in Fig. 5. The device, for blowing steam into a tube or any part of a boiler requiring cleaning out by force, is shown in Fig. 6. It consists of the pipe handle *A*, to which is screwed at the top, in a "T," the pieces of pipe for the receiving hose and the projecting tube as shown. The hose is connected with coupling with the exhaust or other supply of steam, and the latter is drawn upon through this hose to the delivering line.

The steam blower is quite handy to blow mud, scale or other sort of substance from pipes. Fig. 7 is a section of a combination air and steam blower, with the steam and air pipes adjoining in the metal chamber, at *B*. The steam and air mingle and are carried through the nozzle to the tube or pipe to be blown out. Boiler washers tell me accidents are often due to smutty glass gauges. The glass is often clouded, as at *E*, Fig. 8, when the water is low. Sometimes the yellowish, dirty covering obscures the glass, and the fireman thinks there is water in the boiler, and showing in the glass, when it is not. One of the first duties of the experienced boiler washer is to get the water and steam gauges clean and right. The boiler washer occasionally finds the glass tube black with oily matter, as at *D*. He is not surprised at things like this, nor even when he locates a pipe partly clogged with scale, as at *F*, Fig. 9. One boiler washer discovered a wrench in an exhaust pipe, as at *G*, Fig. 10.

The boiler washer usually gets down to work, however, and does not consider it unusual to find a pair of overalls in the tubes, or an old pair of shoes inside the boiler. He gets out his kit and begins work. Fig. 11 is one of his chipping hammers, Fig. 12 his chipping tool, and Fig. 13 the snakelike jointed metal shaft for probing. The boiler washer averts accidents now and then. On one occasion the shell was found unduly exposed to the furnace heat. Attention was called to the matter by the boiler washer. The engineer failed to do anything about it, so in a few months the shell burst and an accident occurred, as in Fig. 14, at *H*. Boiler washers sound the plates for interior defects, such as corroded bolts and plates, as at *J* and *K*, Fig. 15, and they also find bolts with the threads scored off, as at *M*, Fig. 16.

The careful boiler washer will make a report of all defects of this character. Ordinarily the engineer will look up the matter and see to it that steps are taken to remedy the evil; others are careless and let the weak part get still worse, and an accident happens. It pays to give the job of cleaning to a good boiler washer, providing that there is not a boiler washer employed in the plant.

Percentages of Increase, Central Electric Light and Power Stations.[1]

The commercial and municipal central electric light and power stations in the United States in 1907 numbered 4,714; reported $1,096,913,622 as the cost of construction and equipment; earned $175,642,338, of which $169,614,691 was for electric service, including $125,755,114 for lighting; expended $106,205,149; employed 12,990 salaried officials and clerks, who were paid $11,733,787, and also 34,642 wage earners, who received $23,686,537; operated 10,150 primary machines, with 4,032,365-horse power capacity; had 12,173 dynamos, with a kilowatt capacity of 2,709,225; and their output, in kilowatt hours, was 5,862,276,737. Of the total number of lamps wired for service, there were: Arcs, 555,713; incandescent, 41,445,997; and other varieties, 162,338.

These statistics are set forth in the United States Census Bureau report on the census of central electric light and power stations in the United States in 1907, now in press, prepared under the supervision of Wm. M. Steuart, Chief Statistician for Manufactures, assisted by T. Commerford Martin, of New York city, and Frank L. Sanford. It will be submitted by Director Durand to Secretary Nagel, of the Department of Commerce and Labor, and will be ready for general distribution in about a month.

The Classes of Stations.—The central stations from which reports were received are classed as "commercial," or those operated under private ownership, and "municipal," or those operated by municipalities These two classes are each further divided into "purely electric" and "composite," the former being those devoted solely to the generation and sale of electrical energy. The majority are of the "purely electric" class. The "composite" stations are those engaged in the electric business and also in other industries, such as water works, gas plants, etc. The municipal stations frequently sell large quantities of electricity for commercial uses.

The percentages of increase in 1907, as against 1902, the date of the last census of this kind, are 30.2 in the total number of stations; 117.3 in the cost of construciion and equipment; 104.9 in gross income; 91.5 in total expense; 35.6 in the number of primary horse power machines and 120.3 in their total horse power capacity; 123.5 in kilowatt capacity of dynamos; 201.7 in kilowatt capacity of the alternating single-phase and polyphase current dynamos; 133.8 in the output of stations; 44.1 in the number of arc lamps; and 127.8 in the number of incandescents.

Incorporated Companies in the Majority.—One of the distinctive features of the report is the statement that nearly three-fourths of the stations reported at each census were operated by incorporated companies. Individual ownership was next in importance, the number of stations being less than one-fifth of the total at each census. Firms showed but little proportionate change at both censuses.

A comparison of the totals for the "purely electric" and "composite" central electric stations shows that in 1907 about three-fifths of the income and cost of construction and equipment were connected with the former and two-fifths with the latter. Nearly two-thirds of the commercial central stations were reported as "purely electric," and something more than one-third as "composite," and the proportions represent their respective importance. Nearly four-fifths of those in the "composite" group are commercial stations.

It is said to be noteworthy that both the commercial and the municipal stations share in the uniformly large percentage of increase for the "composite" stations, which appears to indicate that the distinctive characteristics of the two principal classes of stations are much less marked than formerly.

As a rule the central electric stations are concentrated in the most populous States, and at points within these States from which the largest percentage of the population can be served economically. New York, Pennsylvania, Illinois and Ohio, containing together 29.6 per cent. of the total population of the United States, reported 1,296 electric stations, or 27.5 per cent. of the total number in operation during 1907, and the annual output of these stations amounted to 2,553,745,890 kilowatt hours, or 43.6 per cent. of the output of all stations in the United States.

Western Division's Showing.—Comparing the porportion of population with that for the number of stations, the proportion of stations was larger than that for population for the North Central and Western divisions and smaller for the North Atlantic, South Atlantic and South Central divisions. One of the most pronounced features of the central station industry is the large percentage showing for the Western division, which in 1907, having less than 5,000,000 population, as compared with the population of upward of 11,000,000 and 16,000,000

1. Advance sheets, Census Increase Reports, 110.

por the South Atlantic and South Central divisions, respectively, reaorted a greater primary horse power and larger dynamo capacity dnd more incandescent lamps wired for service than the latter two fivisions combined. In per capita showing, the North Atlantic division was second in rank, the North Central third, the South Atlantic ourth, and the South Central fifth.

The report states that the development of the alternating current by means of the single phase or polyphase dynamo, referred to in the report for 1902, has continued since that census until, at the census of 1907, the kilowatt capacity of this class of machines represented 82 per cent. of the total dynamo capacity of all central stations. In many instances large plants are now located at places where water power is available for the generation of the current, but at great distances from where the current is used.

Statistics relative to 34 selected cities are presented in the report. These are: Chicago, New York, Philadelphia, St. Louis, Cincinnati, Cleveland, Denver, Indianapolis, Louisville, Minneapolis, New Orleans, St. Paul, Washington, D. C.; Worcester, Mass.; Dayton, O.; Des Moines, Ia.; Duluth, Minn.; Erie, Pa.; Evansville, Ind.; Holyoke, Mass.; Mobile, Ala.; Reading, Pa.; San Antonio, Tex.; Wilmington, Del.; Anderson, Ind.; Cumberland, Md.; Flint, Mich.; Hannibal, Mo.; Lewiston, Me.; Northampton, Mass.; Oklahoma City, Okla.; Paducah, Ky.; Richmond, Ind.; and Shreveport, La.

These 34 cities had 75 stations in 1907 and 70 in 1902, the character of ownership of which, in 1907, was as follows: Corporate, 61; municipal, 14. In 1902, 58 were corporate; 11, municipal; 1, individual.

The Uses of Electricity.—While the pricipal income of central stations is derived from lighting and stationary motor service, electricity is being used for a constantly increasing variety of purposes. As evidenced in the statistics of these cities, the central electric stations in them reported for 1907 an income from electric railway service amounting to $1,960,551, as against $138,275 in 1902; from sales of electric energy to other electric companies in 1907, $779,728; from heating, cooking, welding, etc., in 1907, $117,560, as compared with $24,451 in 1902; and from charging automobiles in 1907, $135,121, as against $24,775 in 1902.

In 1907 nearly one-fourth of the primary power for the entire 4,714 central stations was connected with the 75 stations in these cities. The proportion of steam power to the total primary power in these cities was 92.5 per cent. in 1907, and 98.7 per cent. in 1902, as compared with 65.2 per cent. and 75.4 per cent. respectively, for the United States.

As illustrative of the extensive use of the steam turbine in the more thickly settled communities, 55.6 per cent. of the total power reported for them was by the stations in these 34 selected cities. The gas engine was very little used in these cities, only 4 engines, with a total of 60-horse power, being reported in 1907.

Exclusive of the horse power of the gas engines, which was comparatively insignificant, the horse power capacity reported by all central stations in the United States in 1907 was about ¾ steam and ¼ water. In 1902 the proportions were about ¾ steam and ¼ water.

For the 34 cities, in 1907 more than 9-tenths was steam and less than 1-tenth water, while in 1902 practically all the primary power was steam. Notwithstanding the gain in kilowatt capacity of dynamos, there was a general decrease in their number, owing to the fact that the average capacity of the dynamos in 1907 was much greater than was reported in 1902.

The extent of the predominance of the small central station is evidenced by the fact that 81.8 per cent. of stations in 1907 and 87.7 per cent. in 1902 were under 500-kilowatt capacity, while considerably more than one-half of all—64.4 per cent. in 1907 and 71.5 per cent. in 1902—were under 200-kilowatt capacity. The commercial stations made the only increase in the class of largest dynamo capacity.

The "Composite" Stations.—Of the 4,714 central electric stations, the "composite" central stations, or those which were operated in connection with other industries, numbered 2,066. These stations were associated with 2,306 industries of various kinds, the excess of industries deing due to the fact that a single central station may be associated with several other industries. The association of central stations with water works and gas plants is the most common, and for the municipal plants there was practically no other. For the commercial stations there were 995 operated in connection with such public services as water works, gas works, street railways, steam heating, and the manufacture of ice, and 573 stations operated in connection with some other business. The central stations associated with such industries as sawmills, gristmills, manufactured ice, and cotton gins are likely to be of secondary importance, and owe their existence to the facility with which surplus primary power, by use of the dynamo, may be converted into electrical energy and transmitted for service as light or power to near-by or remote points.

Of the various industries mentioned, the manufacture of illuminating gas comes into the most direct competition with the generation of electrical energy.

Comparing the sale of electrical energy with that of gas, the report shown an increase in 1907 of 101.5 per cent. for the central electric stations and 62.3 per cent. for the gas plants.

In 1907, 329 stations reported that they also operated gas plants, but this by no means represents the extent to which the consolidation of the interests of the two industries has been carried, since it does not cover instances wherein the whole, or a controlling portion, of the stock of one industry has been acquired by the other, and the companies are operated under separate management regardless of stock ownership. There is a growing tendency to avoid the sharp competition whenever they are common bidders for the same class of business.

Items of Interest
FROM VARIOUS LOCALITIES.

Mr. S. Pemberton Hutchinson has been elected President of the Westmoreland and Penn Gas Coal Companies, vice the late Mr. Edmund H. McCullough.

It is said that the proprietors of the Ocean County (N. J.) Gas Company, whose gas plant at Tom's River is nearing completion, have asked for a franchise to send gas into Island Heights Borough, and propose to ask like privileges from the authorities of the shore towns from Tom's River, South on the Ocean Highway to Barnegat Village, and West through the pines to Lakehurst. In case these franchises are assented to, the Company will have to put down 25 to 30 miles of trunk line mains, to say nothing of the network of street mains in the villages thus hooked up.

It is said that Mr. J. M. Siebert will succeed Mr. Joseph Steinen as Manager of the Pekin (Ills.) Gas and Electric Company. Mr. Steinen at the present time is Superintendent of the electric light plant.

"W. B.," writing to the Journal, under date of the 27th ult., says: "It gives me pleasure to say that when the Iowa Gas Association some days ago elected Mr. Austin Burt its President, it acted wisely and well, as will be amply shown during his incumbency of the office. Before giving some lines regarding Mr. Burt's career, I would like to call the attention of the industry at large to the amazing growth made by it in the last 10 years in the State of Iowa. Harking back to 1881, when the electric light turmoil of introduction was past the initiative stage, Iowa had less than 10 gas companies, while now it has not far from 50—well over 45, at any rate. And fully 50 per cent. of the existing suppliers of gas commenced their corporate existence as suppliers of electric currents only. To go further, I venture the prediction that the percentage growth (number of companies) of the gas industry in the State will exceed in the next 10 years the growth recorded in like times from 1900 to 1910. To men like McLean, of Dubuque, and the Jones-Hovey combination, the elder Averill, and dozens of others who have gone to their final resting places, is due this fittest survival of the gas industry. Now their earlier efforts have been supplanted by several strong syndicates, and it needs not much of a wiseacre to predict, with the knowledge that the prediction is but a little in advance of its realization, that the future of the gas trading in Iowa is to be as pronounced as was the gain therein during the first decade of the 20th century. To come back to Mr. Burt, however. He is a native of the Wolverine State, having been born in Detroit, June 20, 1870. Graduating from a Detroit public school, he completed the under course at the Black River (Wis.) High School, and then took a mechanical and engineering course in the Wisconsin State University, which was succeeded by a 2-year course along similar lines in Cornell University, N. Y. In 1894 he was assistant engineer in the Pillsbury mills, Minneapolis. In the fall of the same year he entered the draughting room of the Herzog Bridge Works, Minneapolis, and in 1895 became Chief Engineer of the Spring Valley Iron Smelting Works, in St. Paul. He then took service with the Edward P. Allis Company, Milwaukee, after which he returned to Cornell University and completed his mechanical-engineering course, graduating with the Class in 1900. To show how well his work there was regarded it is only necessary to say that he was awarded membership in the Scientific Honor Society, Sigma XI. In 1901 he was appointed General Manager of the Cedar Falls Electric Company, which properties were greatly benefited under his direction. In the following year he became General Manager of the Waterloo and Cedar Falls Gas and Electric Companies, the properties of which were taken over in 1906, and have been since under the discreet and successful ownership of the Dawes syndicate. Since then the engineering control of the combined properties has been in Mr. Burt's custody. He is a member of the American Gas Institute, of the American Institute of Electrical Engineers, and of the Iowa Electrical Association—he is a past-President (1906) of the last named body. He is also affiliated with the Iowa Engineering Society, and his name is also on the rolls of the School Board, the Library Board, and the Chamber of Commerce, of Waterloo. So, take it all-in-all, I have surely shown that the Iowa District Gas Association was surely not in error when it named Mr. Burt as its official executive head."

We are indebted to a correspondent for a copy of a recent issue of the Atlantic City (N. J.) *Evening Union*, which carries an illustra-

tion of the Gas Company's proposed new office home on Michigan and Atlantic avenues. Our correspondent forwards the following details respecting the structure: "Plans and specifications, prepared by Messrs. Stout & Reibenack, for the new business offices and showrooms of the Atlantic City Gas Company, at Atlantic and Michigan avenues, are for a 3-storied structure, of Greek classic design, of light brick and terra cotta, with terra cotta cornices and base. Entrances to the building, which are to be on the Michigan avenue side, will be of white marble construction. A striking feature of the building will be the large amount of plate glass used for windows, nearly the entire two sides being almost solid walls of plate glass with Verde antique metal finish. On the first floor will be the general business offices, vault, superintendent's office, private offices of officials, heater and boiler rooms. The second floor will be devoted exclusively to demonstration and show purposes, being fitted up to represent the various rooms of a modern home, equipped with up-to-date gas appliances and fixtures. The third floor will be used as a workshop and repair room. Active work on the construction of the building is already under way."

ADVICES from Red Bank, N. J., towards the close of the last month, are to the effect that the Standard Gas Company, of New Jersey, has been purchased by the Union Railway Supply Company, of Philadelphia. The new Company has already taken over the plant and expects to run a main from Atlantic Highlands, N. J., to Red Bank, and abandon the old plant at Matawan. The rate was reduced from $2 to $1.90 per 1,000 cubic feet, commencing the 1st inst., and as soon as the new plant at Atlantic Highlands, and the high pressure main system to here as well, are completed, a uniform net rate of $1.40 gross ($1.50 net) per 1,000 cubic feet will become operative all over the district. Mr. B. H. Garrison, of Red Bank, is General Superintendent, and Mr. T. W. Stark keeps on as Superintendent of the Keyport and Matawan division.

AT the annual meeting of the Peoria (Ills.) Gas and Electric Company the following officers were re-elected: President, H. D. Walbridge; Vice-President, B. C. Cobb; Treasurer, W. H. Brown; Secretary, A. D. Colvin.

THE C. W. Hunt Company, builder of coal handling, conveying and hoisting machinery, has opened offices in the State Bank Building, Richmond, Va., and also in the Rhodes Building, Atlanta, Ga. The latter establishment is under the supervision of Mr. F. W. Lee, for several years Preliminary Engineer to the Hunt corporation. In connection further with the latter it may not be amiss to say that Mr. C. T. Anderson has been appointed Manager of the Chicago office, 1616 Fisher Building.

THE Rockville (Conn.) Gas and Electric Company has adopted a very clever plan in respect of its commercial division. It is in effect nothing else than offering a credit to consumers who sell to other residents appliances. The credits in respect of the several appliances are scheduled according to the appended list:

Class of Business.	Credit Order.
Each gas customer secured	$1.00
" " range sold	1.00
" " cooker sold	.75
" " water heater sold	1.00
" " hot plate sold	.40
" " outlet added	.10
" " radiator sold	.25
" electric customer secured	1.00
" " motor sold (per horse power)	1.00
" " iron sold	.50
" " fan sold	.50

Other electric appliances sold, 10 per cent. of selling price.

This series of offers will be operative between June 1st and Dec. 31st, 1910. The Company will give a credit order to each customer turning in anyone or anything according to the above grading and rating, which orders will be accepted as applying on any bills issued for monthly gas consumption, if presented on or before January 1, 1911. To add to the zest of the competition or canvassing, the Company offers the following cash prizes to the three customers securing respectively the three highest totals: To the person securing the highest total, $50; to the second, $25; to the third, $15.

THE concern in Fort Worth, Tex., heretofore known as the Consumers Light and Heating Company, will hereafter be known as the Fort Worth Gas Company.

AT the third annual banquet of the Denver (Col.) Gas and Electric Company, which was held about a fortnight ago in the rooms of the Colorado Traffic Club, over 100 persons shared. The proceedings were directed by Mr. F. M. Willoughby, as toastmaster, and set speeches were made by Messrs. George Creel (an editorial writer on the "Denver Post"), Chas. H. Elliott, T. L. Curtan, L. A. Ramsey and C. C. Van Vlaack. Easily the banner one of these was, Mr. George Creel, whose clever response to the toast, "Education," was listened to with profound attention, frequently punctuated with hearty applause.

THE Odell syndicate having looked over the site occupied by the factory of the defunct Vulcanite Manufacturing Company, as a likely place for the location of the manufacturing plant of the tentative South Shore Gas Company, Long Island, N. Y., were surprised to find that the selling price thereof had been advanced 100 per cent. or so over that at which it had been offered for sale last fall, and promptly declined to purchase. A location was subsequently secured at West Babylon, Central Extension Branch, Long Island Railroad.

THE City Trustees have directed the City Attorney to arrange for the calling of an extra election of the voters of Huntington Beach, Cal., to determine whether or not a bond issue, in the sum of $40,000, shall be made, the proceeds therefrom to be devoted to the construction of a municipal gas plant to be operated on public account.

MR. W. F. DOELKER has resigned the post of Manager to the Ludington (Mich.) Gas Company to accept a like post at Mount Clemens, Mich.

THE Georgetown (Del.) Gas Company will light the streets of that city for a period of 5 years, the contract to date from the 1st ult.

SUPERINTENDENT LANE is happy in the knowledge that he will have ample holder capacity next winter, for a vessel of that nature is now being constructed there. It is rated to store 100,000 cubic feet.

WE understand that the Byllesby Company, of Chicago, who recently acquired the Coos Bay Gas and Electric Company's properties in Marshfield and North Bend, Ore., will expend a large sum in putting these in proper physical condition. Prominent in the appropriation is an allowance for main extensions, the cost of which will go well into the thousands.

THE City Council, of Long Beach, Cal., has fixed the rates that may be charged there for gas and electric lights at figures equal to those of last year: Gas, net, per 1,000, $1.15; electric current, net, 12 cents per kilowatt hour.

THE contract for a holder up to retaining 5,000,000 cubic feet, for the San Francisco Gas and Electric Company, has been awarded to Messrs. R. D. Wood & Co., of Philadelphia. It is to be 195 feet in diameter, and is to have 4 sections, equalling a height of 188 feet. It will be located on a site at the Potrero station, and is to be completed by April 10, 1911. Actual construction work on it is arranged to commence the 15th prox.

DEAR JOURNAL: I think if you publish the "poetry" along with the inclosed account of the picnic doings of the Atlantic City (N. J.) Gas Company, as those happened in the Hotel Majestic, South Virginia avenue, the "day and night" of June 16th, you will have done your complete duty. I know it is asking you a trifle much with your dignity; but here goes—over 200 had a hand—also, a mouth—in the matter. The "poem" is:

The Gas Men sang,
The Gas Men shouted.
Some of them talked,
Some of them spouted.

They piped the whole city,
Gas permeated the air;
They wined and they dined
Under the gas light glare.

They boasted, they toasted,
Not far from the waves.
Burned "Cole" 'til 'twas hot,
And almost scorched Graves.

'Twas a season of pleasure
Where naught was but joy,
Which tickled the Geist
And delighted the Hoey.

Yes; it is pretty bad. But the reproduction is mainly in hope 'twill act as a deterrent.

MR. EDWARD L. DAVIS, formerly Assistant General Manager of the Allentown (Pa.) Gas Company, has been appointed Travelling Auditor of the U. G. I. Company, with headquarters in Philadelphia.

THE output of gas in Baltimore, Md., for the year 1880 was 790,218,000 cubic feet. Last twelvemonth the output was 2,949,795,000 cubic feet. Nothing very feeble about that growth.

THE death of James Bamrick, at Syracuse, N. Y., in his 63d year, is reported from that city. For close to 30 years he had been foreman in the works of the Syracuse Lighting Company and its predecessors.

The Market for Gas Securities.

Net loss on the week for Consolidated, 7¼ points; reason therefor, none. Possible reason, a Zeppelin air-way train was wrecked somewhere in Germany about mid-week. Consolidated opened to-day (Friday) at 132¼ to 132½; it closed last week (Friday) at 139½ to 139¾.

These odd freaks may not either be attributed to the fact that Consolidated is only paying its shareholders at the rate of 4 per cent. per annum; for Brooklyn Union, which is paying 6 per cent., is quoted at 133 to 136. It is to figure; but, study as hard and as applyingly as we may, the figures that exist are as wrong is to right, in determining actual values. The increase in the dividend rate on Massachusetts gas has borne good fruit—Massachusetts speculators seem a trifle saner than are those on the Wall Street Canyon. Peoples, of Chicago, has acted in a fairly rational manner, although it is easily 20 points below a fair value.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

15 BROADWAY, NEW YORK CITY.

JULY 4.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$73,177,000	100	132¼	132⅛
Central Union Gas Co.— 1st 5's, due 1972, J. & J.	8,000,000	1,000	98	101
Equitable Gas Light Co.— Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.— 1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River— 1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union— 1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	133	136
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106½	107
Yonkers	299,650	500	130	—
Out-of Town Companies.				
Bay State	50,000,000	50	½	⅝
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	90	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	73	73½
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	106½	—
Mortgages, 6's	3,600,000	-	89	100
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	458,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	881,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	108	108½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	98½	99½
Preferred	2,500,000	100	90	100
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	81	81⅛
Preferred	25,000,000	100	92	92¼
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	105	105¼
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	--
Consolidated 5's	2,000,000	—	104¾	105¼
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.— 1st Mtg. 5's	751,000	1,000	100	102

Advertisers' Index.

New advertising, or changes in standing ads., to assure attention the issue following their reception, must be in hand on Wednesday.

AMMONIA CONCENTRATORS.
Bartlett-Hayward Co., Baltimore, Md. 41
Fred Bredel Co., Milwaukee, Wis. 38
Michigan Ammonia Works, Detroit, Mich. 18
The Gas Machinery Co., Cleveland, O. 21
Western Gas Construction Co., Fort Wayne, Ind. 48

BURNERS.
Wm. M. Crane Co., New York City. 32

CEMENTS AND CONCRETES.
C. L. Gerould, New Castle, Pa. 36
Ernst Strassburger, Chicago, Ills. 36
Glidden Varnish Co., Cleveland, O. 18
Laclede-Christy Clay Products Co., St. Louis, Mo. 20

CHARGING BARROWS & COAL WAGONS.
Davis & Farnum Mfg. Co., Waltham, Mass. 40
Kerr Murray Mfg. Co., Fort Wayne, Ind. 43
The Stacey Mfg. Co., Cincinnati, O. 44

COKE CRUSHERS.
Bartlett-Hayward Co., Baltimore, Md. 41
C. M. Keller, Columbus, Ind. 39

CONVEYORS—ALL KINDS.
Bartlett-Hayward Co., Baltimore Md. 41
Brown Hoisting Machinery Co., Cleveland, O. 26
Cruse-Kemper Co., Ambler, Pa. 28
C. W. Hunt Company, New York City. 30
Fred Bredel Co., Milwaukee, Wis. 38
G. A. Bronder, New York City. 37
Kerr Murray Mfg. Co., Fort Wayne, Ind. 43
The Gas Machinery Co., Cleveland, O. 23
The Stacey Mfg. Co., Cincinnati, O. 44
Western Gas Construction Co., Fort Wayne, Ind. 48

EXHAUSTERS.
Connelly Iron Sponge & Governor Co., New York City 37
Connersville Blower Company, Connersville, Ind. 44
Davis & Farnum Mfg. Co., Waltham, Mass. 40
Isbell-Porter Company, Newark, N. J. 27
Kerr Murray Mfg. Co., Fort Wayne, Ind. 43
Piqua Blower Co., Piqua, O. 29
The P. H. & F. M. Roots Co., Connersville, Ind. 31

GAS AND WATER PIPES.
Davis & Farnum Mfg. Co., Waltham, Mass. 40
Donaldson Iron Co., Emaus, Pa 32
R. D. Wood & Co., Philadelphia, Pa. 46

GAS BLAST FURNACES.
American Gas Furnace Co., New York City. 24

GAS COALS.
Berwind-White Coal Mining Co., New York and Phila. 38
Westmoreland Gas Coal Co., Philadelphia, Pa. 39

GAS COCKS.
H. Mueller Manufacturing Co., Decatur, Ills. 21

GAS ENGINEERS.
Bartlett-Hayward Co., Baltimore, Md. 41
Cruse-Kemper Co., Ambler, Pa. 28
Davis & Farnum Mfg. Co., Waltham, Mass. 40
Drakes Limited, Halifax, England. 19
Edwin E. Witherby, New York City. 18
Evens & Howard Firebrick Co., St. Louis, Mo. 1247
Frank D. Moses, Trenton, N. J. 1256
Fred Bredel Co., Milwaukee, Wis. 38
Frederick J. Mayer, New York City. 42
Glenn Marston, New York City. 18
Henry I. Lea, Chicago, Ills. 40
H. M. Byllesby & Co., Chicago, Ills. 40
H. Thurston Owens, New York City. 18
Humphreys & Glasgow, New York City. 40
Improved Equipment Company, New York City. 33
Isbell-Porter Co., Newark, N. J. 27
Kerr Murray Mfg. Co., Fort Wayne, Ind. 43
Laclede-Christy Clay Products Co., St. Louis, Mo. 26
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 36
Quintard Iron Works, New York City. 29
R. D. Wood & Co., Philadelphia, Pa. 46
The Gas Machinery Co., Cleveland, O. 23
The Stacey Mfg. Co., Cincinnati, O. 43
The United Gas Improvement Co., Philadelphia, Pa. 34
Western Gas Construction Co., Fort Wayne, Ind. 48
William A. Raehr, Chicago, Ills. 18
William W. Randolph, New York City. 33

GAS ENRICHERS.
Standard Oil Co., New York City. 39

GAS GAUGES.
The Bristol Co., Waterbury, Conn. 32

GAS GOVERNORS.
Chaplin-Fulton Mfg. Co., Pittsburg, Pa. 37
Connelly Iron Sponge & Governor Co., New York City. 27
Evens & Howard Firebrick Co., St. Louis, Mo. 1247
Isbell-Porter Co., Newark, N. J. 27
Pittsburg Meter Co., East Pittsburg, Pa. 30
Reynolds Gas Regulator Co., Anderson, Ind. 47

GASHOLDERS.
Bartlett-Hayward Co., Baltimore, Md. 41
Chicago Bridge and Iron Works, Chicago, Ills. 22
Cruse-Kemper Co., Ambler, Pa. 28
Davis & Farnum Mfg. Co., Waltham, Mass. 40
Deily & Fowler Mfg. Co., Philadelphia, Pa. 44
Kerr Murray Mfg. Co., Fort Wayne, Ind. 43
R. D. Wood & Co., Philadelphia, Pa. 46
Riter-Conley Mfg. Co., Pittsburgh, Pa. 20
The Stacey Mfg. Co., Cincinnati, O. 43
Western Gas Construction Co., Fort Wayne, Ind. 48

GAS MAIN STOPPERS.
Safety Gas Main Stopper Co., New York City. 39

GAS METER CONNECTIONS.
H. Mueller Manufacturing Co., Decatur, Ills. 21

GAS METERS.
American Meter Co., New York and Philadelphia. 47
D. McDonald & Co., Albany, N. Y. 45
Helme & McIlhenny, Philadelphia, Pa. 47
John J. Griffin & Co., Philadelphia, Pa. 1272
Keystone Meter Co., Royersford, Pa. 46
Maryland Meter and Mfg. Co., Baltimore, Md. 46
Metric Metal Co., Erie, Pa. 47
Nathaniel Tufts Meter Co., Boston, Mass. 46
New York Improved Meter Co., New York City. 30
Pittsburg Meter Co., East Pittsburg, Pa. 30
Rotary Meter Co., New York City. 45
Sprague Meter Co., Bridgeport, Conn. 45

GAS PLANT TOOLS.
H. Mueller Manufacturing Co., Decatur, Ills. 21

GAS STOVES.
American Meter Co., New York and Philadelphia. 47
Keystone Meter Co., Royersford, Pa. 46
Maryland Meter & Manufacturing Co., Baltimore, Md. 46
Nathaniel Tufts Meter Co., Boston, Mass. 46

GAS TAPPING MACHINES.
George Light, Dayton, O. 39
H. Mueller Manufacturing Co., Decatur, Ills. 21

GAS WORKS APPARATUS AND CONSTRUCTION.
Bartlett-Hayward Co., Baltimore, Md. 41
Connelly Iron Sponge & Governor New Co., York City. 37
Cruse-Kemper Co., Ambler, Pa. 28
Davis & Farnum Mfg. Co., Waltham, Mass. 40
Deily & Fowler Mfg. Co., Philadelphia, Pa. 31
Evens & Howard Firebrick Co., St. Louis, Mo. 1247
Fred Bredel Co., Milwaukee, Wis. 38
Gas Engineering Co., Trenton, N. J. 1256
Humphreys & Glasgow, New York City. 30
Improved Equipment Company, New York City. 33
Isbell-Porter Co., New York City. 27
Kerr Murray Mfg. Co., Fort Wayne, Ind. 43
Laclede-Christy Clay Products Co., St. Louis, Mo. 26
Lloyd Construction Co., Detroit, Mich. 24
Quintard Iron Works Co., New York City. 29
R. D. Wood & Co., Philadelphia, Pa. 46
Riter-Conley Mfg. Co., Pittsburgh, Pa. 20
The Gas Machinery Co., Cleveland, O. 23
The Stacey Mfg. Co., Cincinnati, O. 43
The United Gas Improvement Co., Philadelphia, Pa. 25
Western Gas Construction Co., Fort Wayne, Ind. 48

HIGH PRESSURE GAS GOODS.

H. Mueller Manufacturing Co., Decatur, Ills.... 21

HOT WATER HEATERS.

Humphrey Co., Kalamazoo, Mich.... 21

INCANDESCENT GAS LAMPS.

General Gas Light Co., Kalamazoo, Mich.... 25
Welsbach Company, Gloucester, N. J.... 34

INCLINED RETORTS.

Baltimore Retort and Firebrick Co., Baltimore, Md... 36
Didier-March Co., New York City 42
Evens & Howard Firebrick Co., St. Louis, Mo....1247
Fred Bredel Co., Milwaukee, Wis.... 38
Gas Bench Construction Co., St. Louis, Mo.... 39
Improved Equipment Company, New York City.... 33
Laclede-Christy Clay Products Co., St. Louis, Mo.... 26
Parker-Russell Mining and Mfg. Co., St. Louis, Mo... 36

MAIN AND SERVICE LAYING.

Sullivan Bros., Flushing, N. Y.... 39

PATENTS, TRADE-MARKS & COPYRIGHTS

Royal E. Burnham, Washington, D. C.... 39

PIPE LINE TOOLS.

H. Mueller Manufacturing Co., Decatur, Ills.... 21

PREPAYMENT METER ATTACHMENTS.

New York Improved Meter Co., New York City.... 46

PREPAYMENT METERS.

American Meter Co., New York and Philadelphia.... 47
D. McDonald & Co., Albany, N. Y.... 45
Helme & Mollhenny, Philadelphia, Pa.... 47
John J. Griffin & Co., Philadelphia, Pa....1272
Keystone Meter Co., Royersford, Pa.... 46
Nathaniel Tufts Meter Co., Boston, Mass.... 46
New York Improved Meter Co. New York City.... 46
Pittsburg Meter Co., East Pittsburg, Pa.... 30
Sprague Meter Co., Bridgeport, Conn.... 45

PROCESSES.

Bartlett-Hayward Co., Baltimore, Md.... 41
Fred Bredel Co., Milwaukee, Wis.... 38
Humphreys & Glasgow, New York City.... 40
Improved Equipment Company, New York City.... 33
The Gas Machinery Co., Cleveland, O.... 23
The United Gas Improvement Co., Philadelphia, Pa... 35
Western Gas Construction Co., Fort Wayne, Ind.... 48

PRODUCER POWER PLANTS.

R. D. Wood & Co., Philadelphia, Pa.... 46

PURIFIER AND SCRUBBER TRAYS.

Bartlett-Hayward Co., Baltimore, Md.... 41
Cabot Mfg. Co., Hoboken, N. J.... 39
Western Gas Construction Co., Fort Wayne, Ind.... 48

PURIFIERS.

Bartlett-Hayward & Co., Baltimore, Md.... 41
Connelly Iron Sponge & Governor Co., New York City. 37
Cruse-Kemper Co., Amber, Pa.... 28
Davis & Farnum Mfg. Co., Waltham, Mass.... 40
Evens & Howard Firebrick Co., St. Louis, Mo....1247
Isbell-Porter Co., Newark, N. J.... 27
Kerr Murray Mfg. Co., Fort Wayne, Ind.... 43
Quintard Iron Works, New York City.... 29
R. D. Wood & Co., Philadelphia, Pa.... 46
The Stacey Mfg. Co., Cincinnati, O 48
The United Gas Improvement Co., Philadelphia, Pa... 35
Western Gas Construction Co., Fort Wayne, Ind.... 48

PURIFYING MATERIALS.

Connelly Iron Sponge & Governor Co., New York City 37
The United Gas Improvement Co., Philadelphia, Pa... 35

REGENERATIVE FURNACES.

Baltimore Retort and Firebrick Co., Baltimore, Md.. 36
Bartlett, Hayward & Co., Baltimore, Md.... 41
Didier-March Co., New York City.... 42
Evens & Howard Firebrick Co., St. Louis, Mo....1247
Fred Bredel Co., Milwaukee, Wis.... 38
Gas Bench Construction Co., St. Louis, Mo.... 29
Improved Equipment Company, New York City.... 33
J. H. Gautier & Co., Jersey City, N. J.... 36
Laclede-Christy Clay Products Co., St. Louis, Mo.... 26
Missouri Firebrick Co., St. Louis, Mo.... 36
Parker-Russell Mining and Mfg. Co., St. Louis, Mo... 36

RETORTS AND FIREBRICKS.

Baltimore Retort and Firebrick Co., Baltimore, Md... 36
Didier-March Co., New York City.... 42
Evens & Howard Firebrick Co., St. Louis, Mo....1247
Fred Bredel Co., Milwaukee, Wis.... 38
Gas Bench Construction Co., St. Louis, Mo.... 29
Henry Maurer & Son, New York City.... 29
Improved Equipment Company, New York City.... 33
James Gardner, Jr., Co., Bolivar, Pa.... 34
J. H. Gautier & Co., Jersey City, N. J.... 36
Laclede-Christy Clay Products Co., St. Louis, Mo.... 26
Missouri Firebrick Co., St. Louis, Mo.... 36
Parker-Russell Mining and Mfg. Co., St. Louis, Mo.... 36

SCRUBBERS AND CONDENSERS.

Bartlett-Hayward Co., Baltimore, Md.... 41
Cruse-Kemper Co., Amler, Pa.... 28
Davis & Farnum Mfg. Co., Waltham, Mass.... 40
Evens & Howard Firebrick Co., St. Louis, Mo....1247
Fred Bredel Co., Milwaukee, Wis.... 38
Isbell-Porter Co., Newark, N. J.... 27
Kerr Murray Mfg. Co., Fort Wayne, Ind.... 43
Quintard Iron Works, New York City.... 29
R. D. Wood & Co., Philadelphia, Pa.... 46
Riter-Conley Mfg. Co., Pittsburgh, Pa.... 20
The Gas Machinery Co., Cleveland, O.... 23
The Stacey Mfg. Co., Cincinnati, O. 43
The United Gas Improvement Co., Philadelphia, Pa... 35
Western Gas Construction Co., Fort Wayne, Ind.... 48

SELF-SEALING MOUTHPIECE DOORS.

Bartlett-Hayward Co., Baltimore, Md.... 41
Davis & Farnum Mfg. Co., Waltham, Mass.... 40
Fred Bredel Co., Milwaukee, Wis.... 38
Isbell-Porter Co., Newark, N. J.... 27
Improved Equipment Company, New York City.... 33
Kerr Murray Mfg. Co., Fort Wayne, Ind.... 43
Parker-Russell Mining and Mfg. Co., St. Louis, Mo.... 36
Quintard Iron Works, New York City.... 29
R. D. Wood & Co., Philadelphia, Pa.... 46
The Gas Machinery Co., Cleveland, O.... 23
The Stacey Mfg. Co., Cincinnati, O.... 43
Western Gas Construction Co., Fort Wayne. Ind.... 48

STOKING MACHINERY.

Fred Bredel Co., Milwaukee, Wis.... 38
G. A. Bronder, New York City.... 37
Laclede-Christy Clay Products Co., St. Louis, Mo.... 26
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. ... 36

STORAGE TANKS.

Bartlett-Hayward Co., Baltimore, Md.... 41
Davis & Farnum Mfg. Co., Waltham, Mass.... 40
Quintard Iron Works, New York City.... 29
The Stacey Mfg. Co., Cincinnati, O.... 43
Western Gas Construction Co., Fort Wayne, Ind.... 48

STREET LAMPS.

Thos. T. W. Miner, New York City.... 19
Welsbach Street Lighting Co., New York and Phila.. 34

TAR AND CARBONIC ACID EXTRACTOR.

Bartlett-Hayward Co., Baltimore, Md.... 41
Fred Bredel Co., Milwaukee, Wis.... 38
Isbell-Porter Co., Newark, N. J.... 27
Kerr Murray Mfg. Co., Fort Wayne, Ind.... 43
The Gas Machinery Co., Cleveland, O.... 23
The Stacey Mfg. Co., Cincinnati, O. 43
The United Gas Improvement Co., Philadelphia, Pa... 35
Western Gas Construction Co., Fort Wayne, Ind.... 48

VALVES.

Bartlett-Hayward & Co., Baltimore, Md.... 41
Davis & Farnum Mfg. Co., Waltham, Mass.... 40
Isbell-Porter Co., Newark, N. J.... 27
Kerr Murray Mfg. Co., Fort Wayne, Ind.... 43
Ludlow Valve Manufacturing Co., Troy, N. Y.... 29
R. D. Wood & Co., Philadelphia, Pa.... 46
The Gas Machinery Co., Cleveland, O.... 23
The P. H. & F. M. Roots Co., Connersville, Ind.... 31
The Stacey Mfg. Co., Cincinnati, O.... 43
Western Gas Construction Co., Fort Wayne, Ind.... 48

VERTICAL S'S.

Connelly Iron Sponge & Gov. Co. (Drake's [Eng.] System) 37
Didier-March Co., New York City.... 42
Evens & Howard Firebrick Co., St. Louis, Mo....1247
Fred Bredel Co., Milwaukee, Wis.... 38
Gas Bench Construction Co., St. Louis, Mo.... 29
Improved Equipment Company, New York City.... 33
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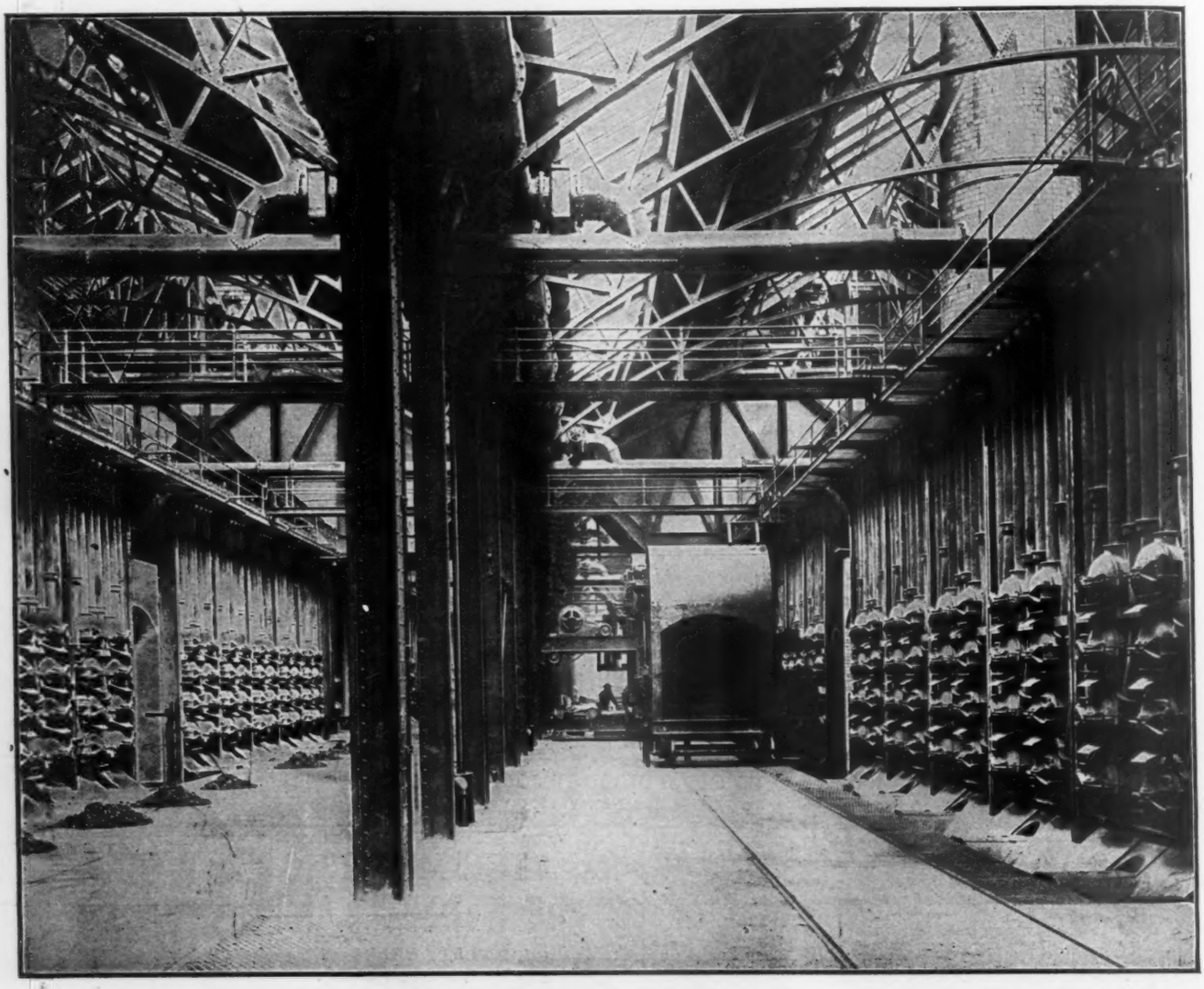

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MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October, 1910. New York City. Officers: President, Wm. H. Bradley, N. Y., City; Secretary, A. B. Beadle, 29 West 39th street, N. Y. City.

Canadian Gas Association.—Annual meeting, June, 1911. ————. Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1910. New York City. Officers: President, C. R. Huntley, Buffalo, N, Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Guild of Gas Managers of New England.—Annual meeting, December. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, A. K. Quinn; Newport, R. I.; Secretary, Walter G. Africa, Manchester, N. H.

Illinois Gas Association.—Annual meeting, time, March, Chicago, Ills. Officers: President, A. S. Harrington, Chicago, Ill.; Secretary-Treasurer, C. B. Strohn, Elgin, Ill.

Illuminating Engineering Society.—Annual meeting, Baltimore, Md., Oct., 1911. Meetings of Sections, monthly. President, W. H. Gartley, Philadelphia, Pa.; Secretary, Preston S Millar, 29 W. 39th street, N. Y. City. Sections: New York: Secretary, Albert J. Marshall, 227 Fulton street. New England, Secretary, L. D. Gibbs 39 Boylston street, Boston, Mass. Philadelphia, Secretary, F. N. Morton, Broad and Arch streets Chicago, Secretary, T. R. Beebe, 157 Michigan avenue,

Indiana Gas Association.—Annual meeting, January 19, 1911, Fort Wayne, Ind. Officers: President, Carl H. Graf, Indianapolis; Vice-President, S. E. Mulholland; Secretary-Treasurer, Philmer Eves, Indianapolis Gas Company, Indianapolis, Ind.

Iowa District Gas Association.—Annual meeting, time, June, 1911, ————. Officers: President, Austin Burt, Waterloo, Ia.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ———— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association—Annual meeting, time, September, 1910; ———— Officers: President, B. O. Tippy, Grand Rapids, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April 13, 14 and 15, 1911; St. Louis, Mo. Officers: President, R. J. Irvine; Secretary and Treasurer, W. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, December, 1911: Boston. Officers: President, E. N. Wrightington, Boston; Secretary, Louis Stotz, 30 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May ————, 1911; Pittsburgh, Pa. Officers: President, John M. Garard, Secretary, T. C. Jones, Delaware, O. Editor Wrinkle Department, F. W. Stone, Ashtabula, O.

New England Gas Association.—Annual meeting, third Wednesday in February; Boston. Officers: President, W. H. Snow, Holyoke, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

Oklahoma Public Utilities Association.—Annual meeting, May 9, 10 and 11, 1911. Officers: President, E. C. Reynolds; Secretary, Galen Crow, Guthrie, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. 20, 21 and 22, 1910, Los Angeles, Cal. Officers: President, W. B. Cline, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 925 Franklin street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1911, Reading, Pa. Officers: President, J. H. Keppelman, Reading, Pa.; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, December, 1910; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 1123 Broadway, New York.

Southern Gas Association.—Annual meeting, Feb. 16, 1911, Montgomery, Ala. Officers: President, H. W. Frund, Salisbury, N. C.; Secretary-Treasurer, Jas. Ferrier, Rome, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. May, 1911, ———— Tex. Officers: President, W. B. Tuttle, San Antonio, Tex.; Secretary, H. B. Head, Stephensville, Tex.

Wisconsin Gas Association.—Annual meeting, May ————, 1911, Milwaukee, Wis. Officers: President, W. H. Winslow, Superior, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.

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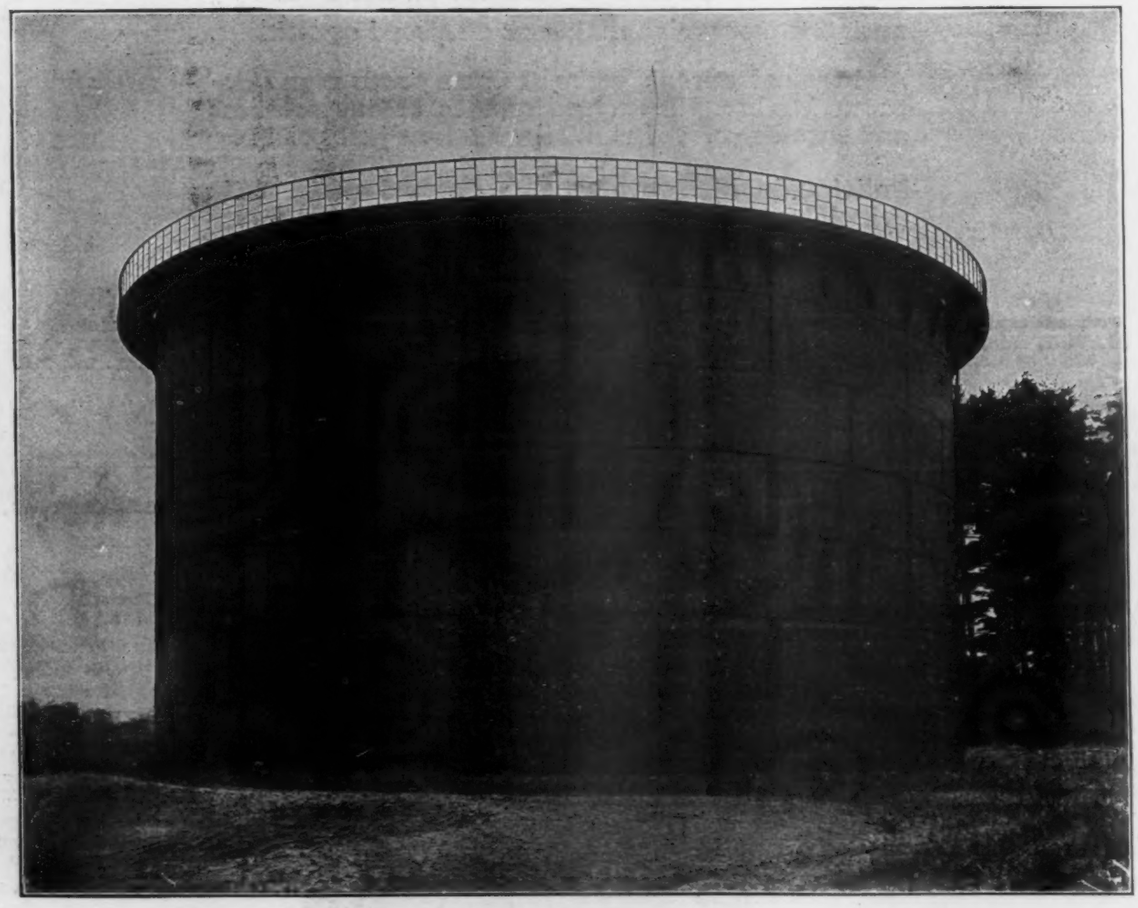

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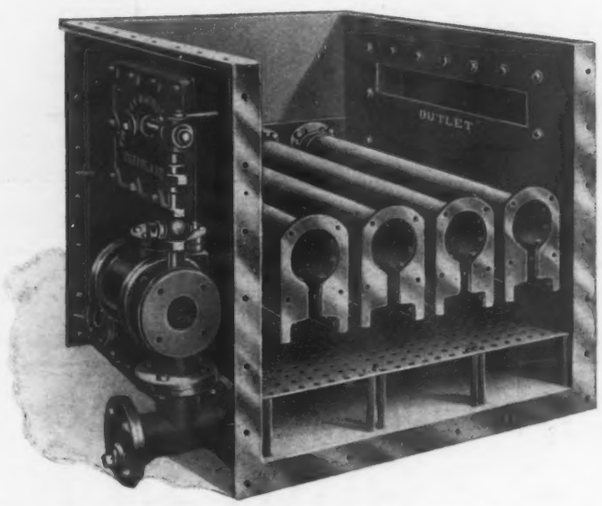

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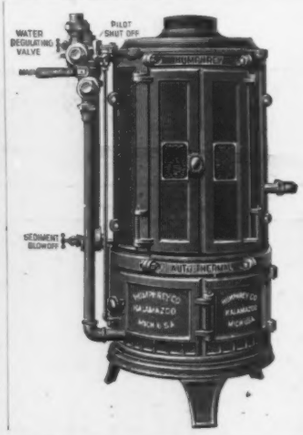

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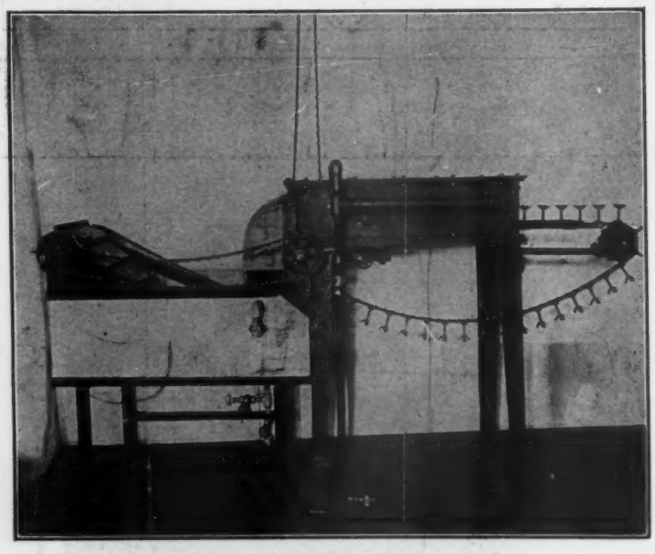

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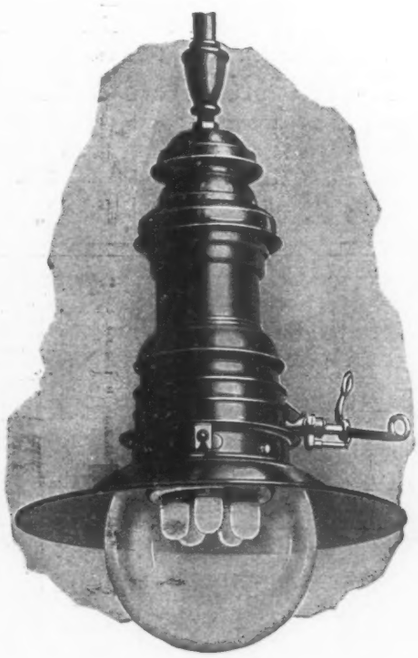

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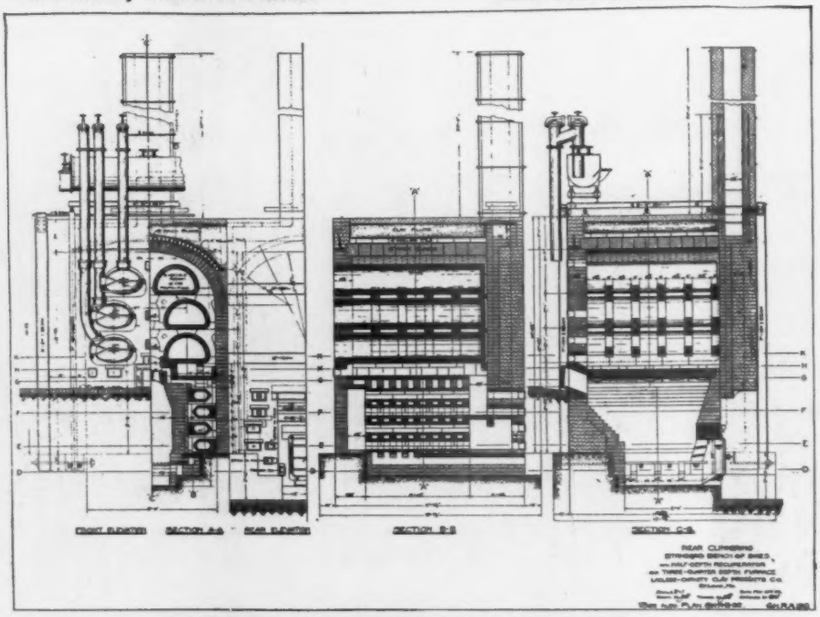

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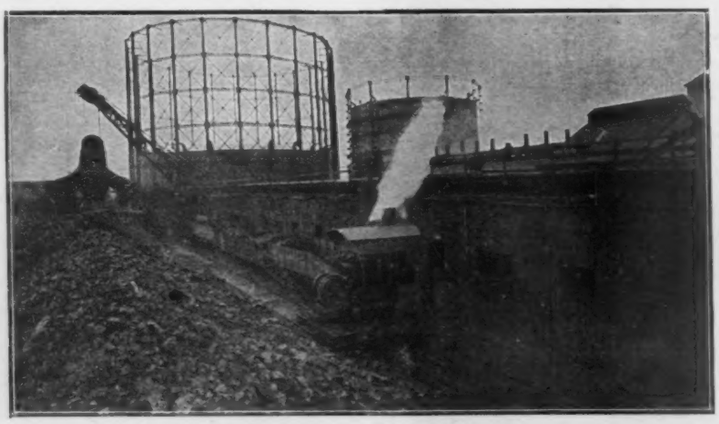

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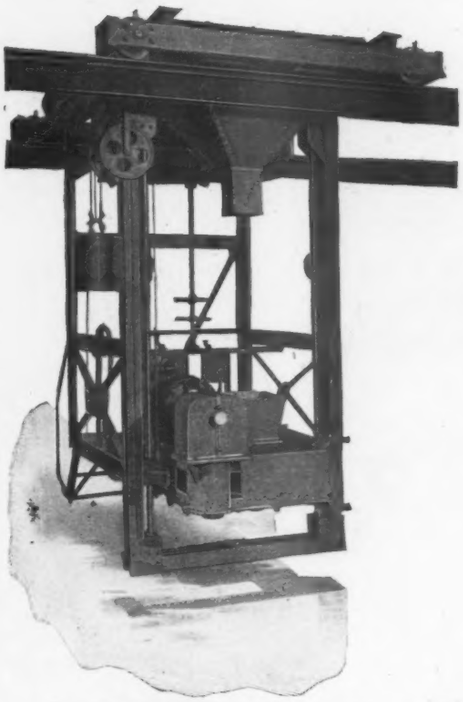

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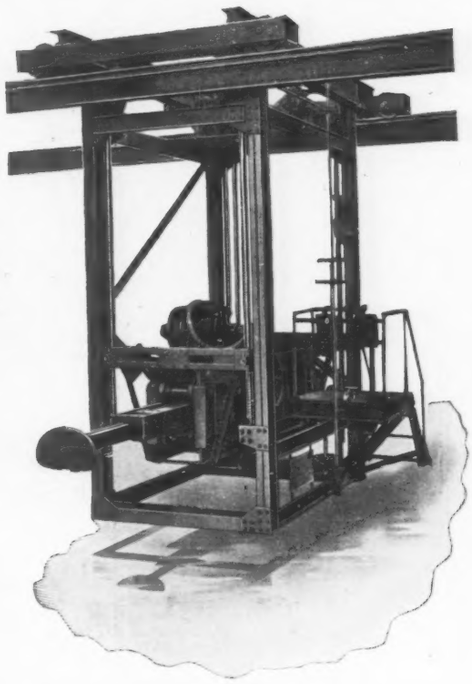

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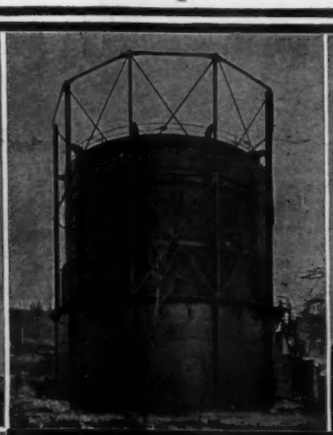

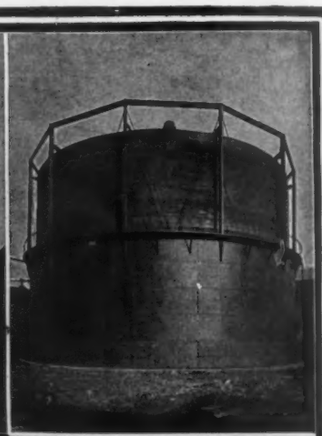

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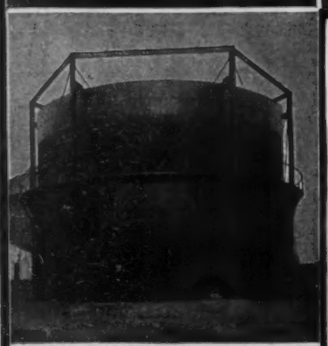

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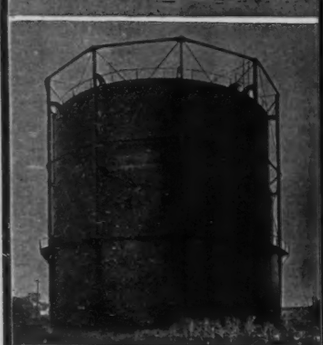

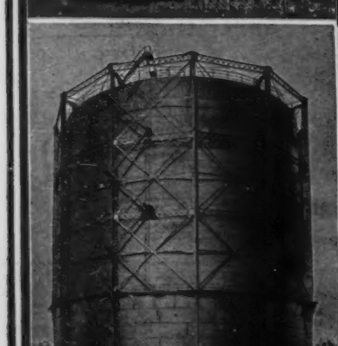
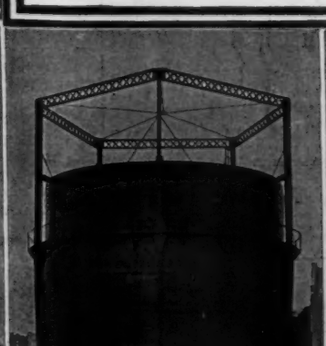

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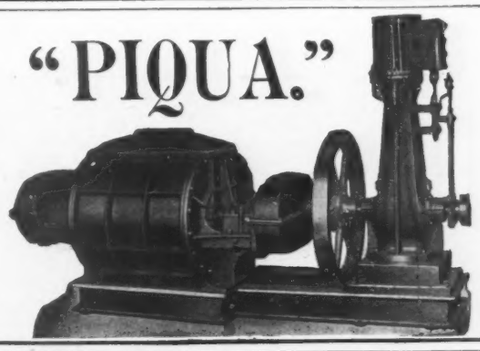

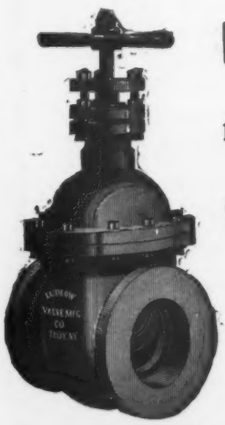

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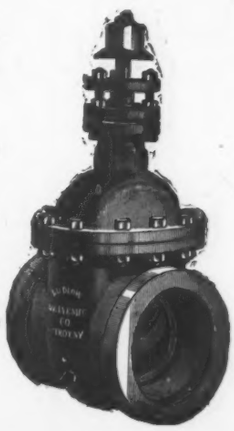

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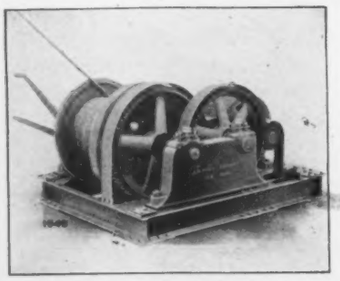

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						From Time Given.	
		P.M.				P.M.	A.M.
Fri.	1	8.00	2.00 A.M.	Fri.	1	7.27	3.07
Sat.	2	8.00	2.30	Sat.	2	7.22	3.07
Sun.	3	8.00	3.40	Sun.	3	7.22	3.07
Mon.	4	8.00	3.40	Mon.	4	7.22	3.07
Tue.	5	8.00	3.40	Tue.	5	7.22	3.07
Wed.	6	8.00 N.M.	3.40	Wed.	6	7.22	3.07
Thu.	7	8.00	3.40	Thu.	7	7.22	3.07
Fri.	8	8.00	3.40	Fri.	8	7.22	3.07
Sat.	9	8.00	3.40	Sat.	9	7.17	3.12
Sun.	10	8.00	3.40	Sun.	10	7.17	3.12
Mon.	11	9.50	3.40	Mon.	11	7.17	3.12
Tue.	12	10.10	3.40	Tue.	12	7.17	3.12
Wed.	13	10.40 F.Q.	3.40	Wed.	13	7.17	3.12
Thu.	14	11.00	3.40	Thu.	14	7.17	3.12
Fri.	15	11.20	3.40	Fri.	15	7.17	3.12
Sat.	16	11.50	3.40	Sat.	16	7.12	3.17
		A.M.					
Sun.	17	12.20	3.50	Sun.	17	7.12	3.17
Mon.	18	1.00	3.50	Mon.	18	7.12	3.17
Tue.	19	1.40	3.50	Tue.	19	7.12	3.17
Wed.	20	No L.	No L.	Wed.	20	7.12	3.17
Thu.	21	No L. F.M.	No L.	Thu.	21	7.12	3.17
Fri.	22	No L.	No L.	Fri.	22	7.12	3.17
Sat.	23	7.50 P.M.	9.50 P.M.	Sat.	23	7.07	3.22
Sun.	24	7.50	10.20	Sun.	24	7.07	3.22
Mon.	25	7.50	10.40	Mon.	25	7.07	3.22
Tue.	26	7.50	11.10	Tue.	26	7.07	3.22
Wed.	27	7.50	11.40	Wed.	27	7.07	3.22
Thu.	28	7.50 L.Q.	12.00	Thu.	28	7.07	3.22
Fri.	29	7.50	12.30 A.M.	Fri.	29	7.07	3.22
Sat.	30	7.50	1.10	Sat.	30	7.02	3.27
Sun.	31	7.40	1.50	Sun.	31	7.02	3.27

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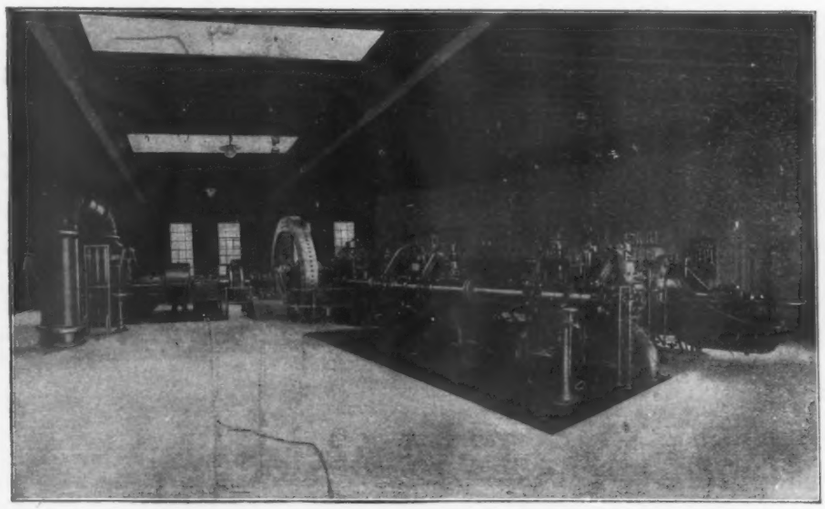

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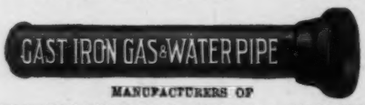

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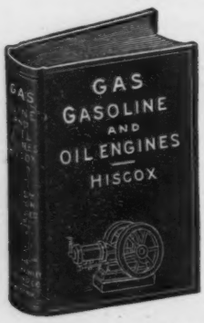

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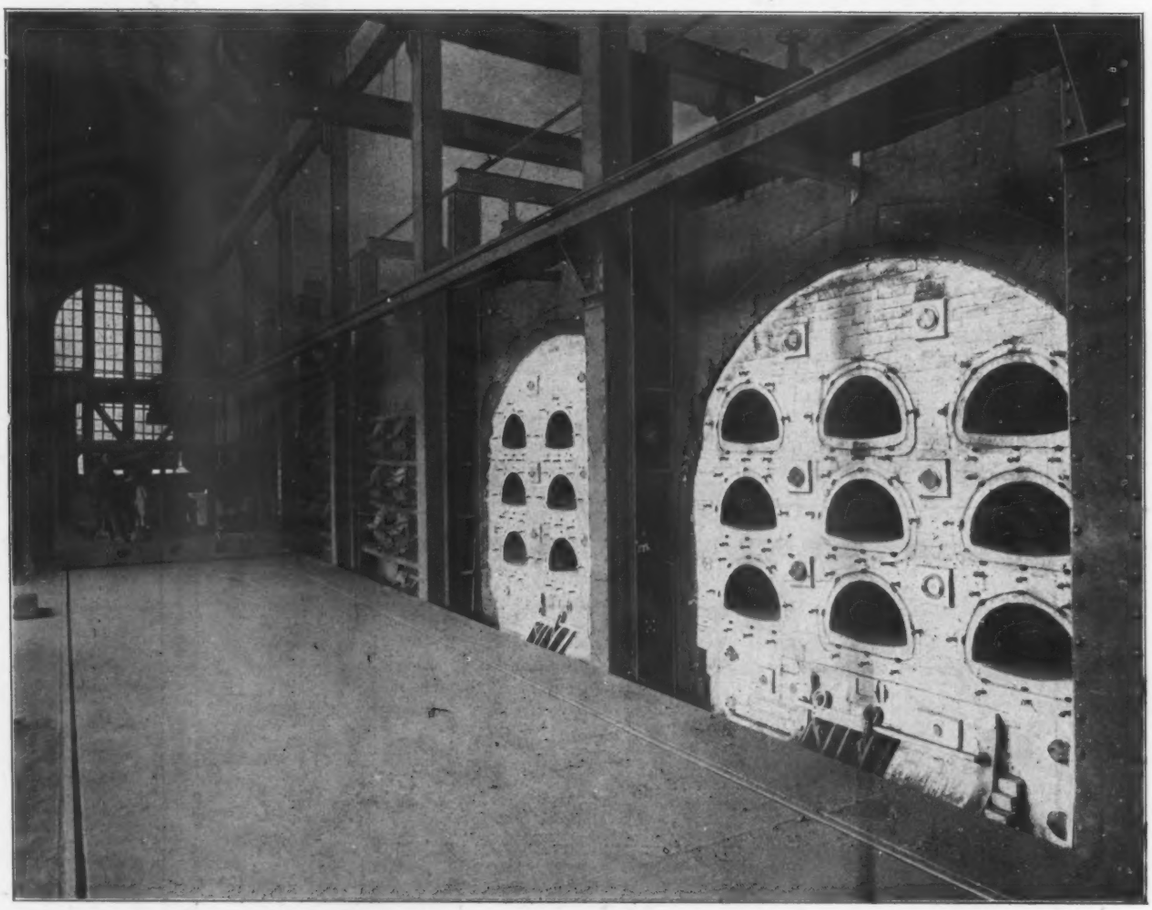

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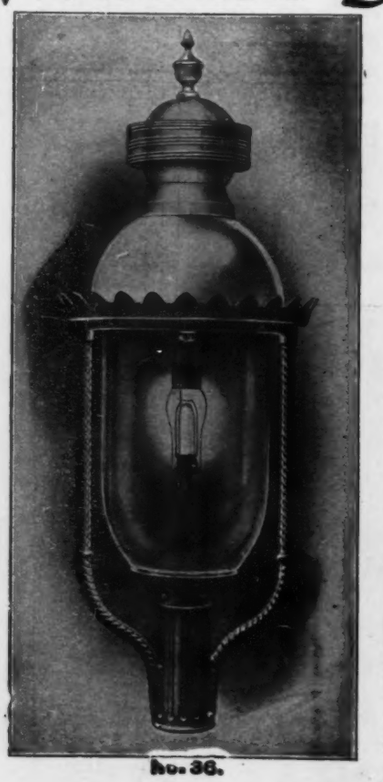

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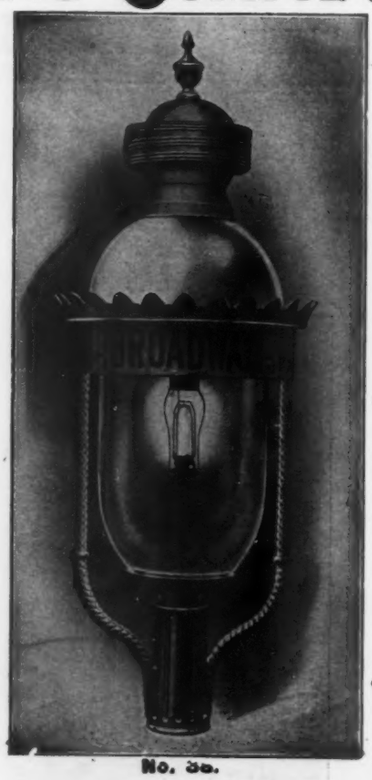

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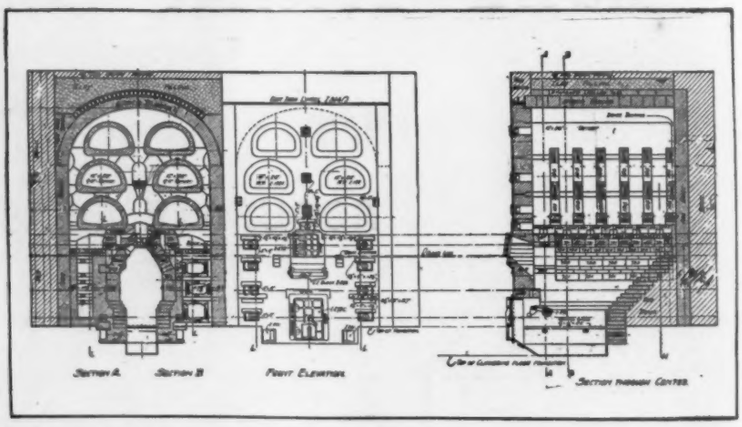

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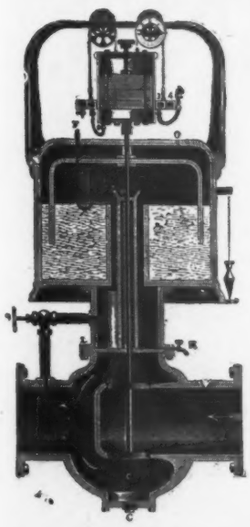

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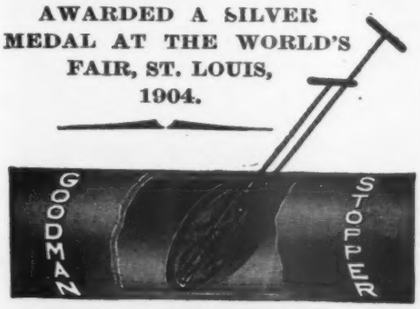

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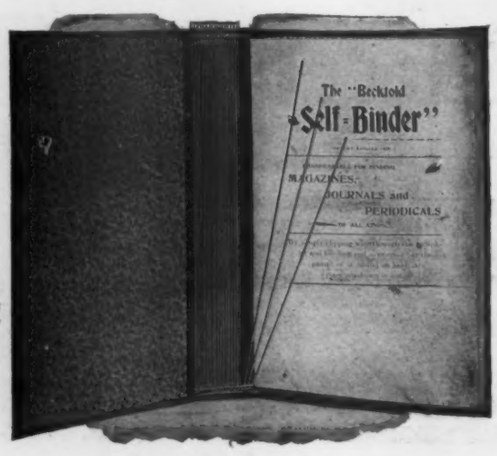

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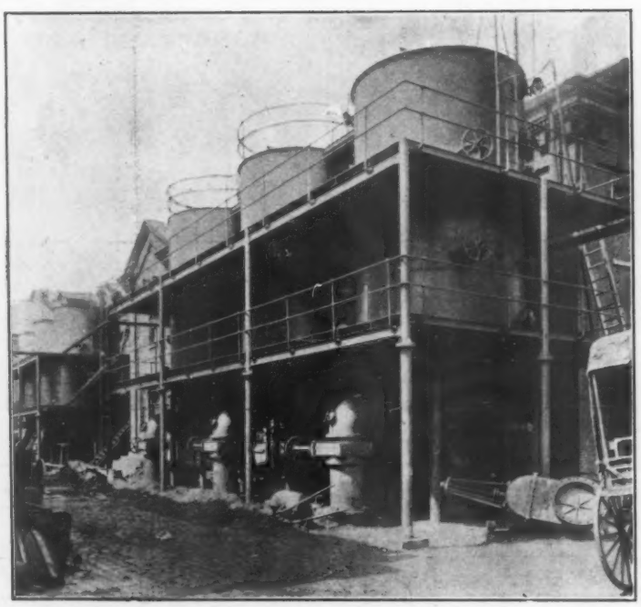

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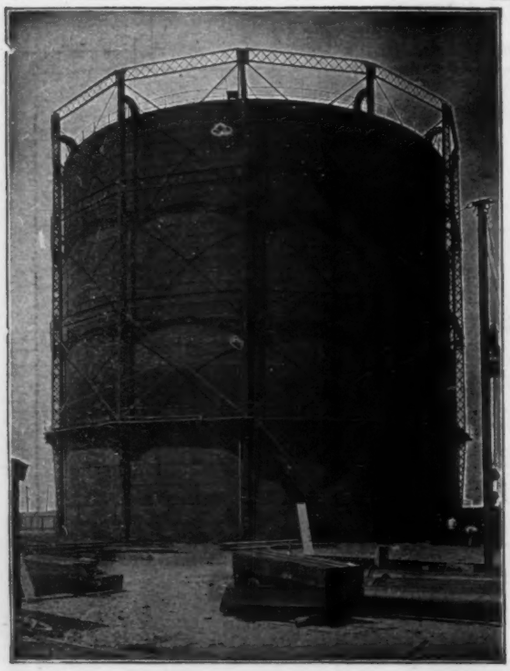

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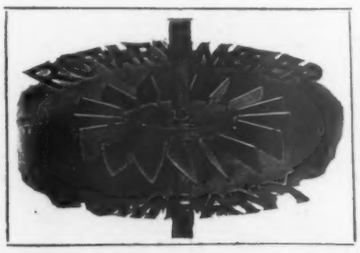

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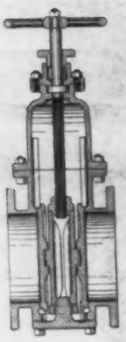

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